

SPRING 2008

Harvard Medical

ALUMNI BULLETIN

CHORDS OF DISQUIET

Did psychiatric illness help
or hinder the creativity
of some of history's most
celebrated composers?





PIONEER

1891

Ida Henrietta Hyde was a woman of firsts: first woman researcher at Harvard Medical School, in its Department of Physiology; first female graduate of Germany's University of Heidelberg; and first woman to be elected to the American Physiological Society. Although she was accepted to the Johns Hopkins School of Medicine, Hyde chose to research animals' physiological systems instead. To aid in this effort, in the 1930s she invented the microelectrode, a device credited with revolutionizing neurophysiology.

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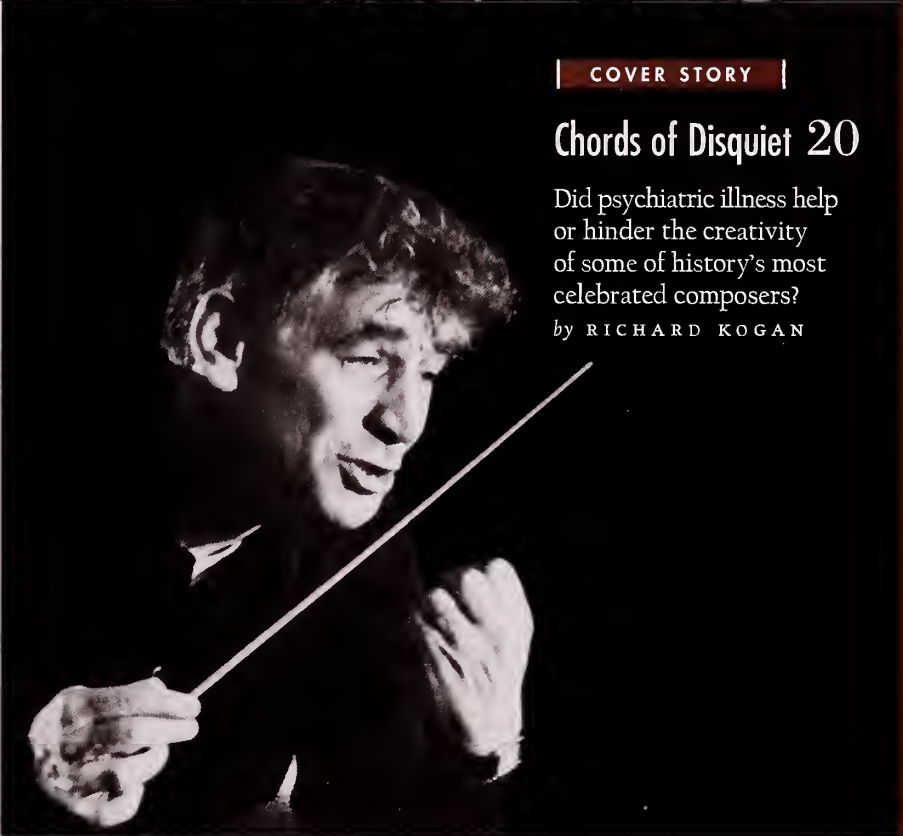
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Cover photo of George Gershwin: Edward Steichen/Condé Nast Archive/Corbis

In This Issue

EXPERTISE IS A RECIPE FOR EXTINCTION. SPECIALIZATION AND MASTERY ARE advantages only when an ecological niche remains unchanged. Who can know whether the dinosaurs looked out on the world they were losing with placid or terrified eyes? What we do know is that most members of the species *Iatromegalos americanus*, also known as American physicians, are aware that something resembling disaster is impending, and many of them are alarmed, but also seemingly immobilized, by the prospect.

U.S. medicine has developed matchless capacity but suffers from severely impaired delivery. Endowed with the most expensive health care system in the world, the United States achieves a relatively low yield in the health of its population as compared with those of other developed countries. We all know this is the case. Why are we not ashamed? Why are we not changing it?

In the first half of the past century, “organized medicine”—also known as the American Medical Association—was successful in helping to block a national health care plan, calling it socialized medicine. In 1939, Morris Fishbein, for 25 years editor of the AMA’s journal, called the plan, “. . . a beginning invasion by the state into the personal life of the individual . . . a definite step toward either communism or totalitarianism.”

However misleading, this theme has ever since been a mainstay of opposition to a national health care program. It resurfaced in Ronald Reagan’s 1961 venture into politics on behalf of the AMA, when he warned that if Medicare legislation were to pass, “one of these days you and I are going to spend our sunset years telling our children and our children’s children what it once was like in America when men were free.” Three decades later, the insurance industry successfully played the same notes in its “Harry and Louise” advertisements, indefinitely setting back health care reform.

Now it is 2008, and patients have learned how severely private insurance can restrict their freedom to choose a physician; physicians have learned how thoroughly their therapeutic choices can be limited; and both have experienced considerable intrusion into the privacy of their relationship. The AMA continues to favor private insurance, but now with government subsidies. Other physician groups argue that nothing short of a universal, national plan makes economic or medical sense. And many in the trenches are disengaged. In this issue of the *Bulletin*, Daniel Federman ’53 calls on physicians to recognize that medicine cannot continue on its old course and to get serious about plotting a new one.

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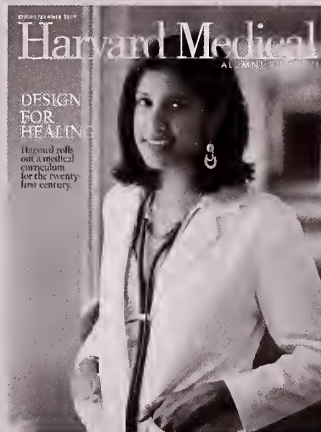
REBELS WITHOUT A PAUSE

Plaudits for your excellent Spring/Summer 2007 issue on medical education. I especially enjoyed the “Endnotes” piece on the curriculum rebellion of 1966, which was triggered by students’ concerns that they were rapidly going brain-dead under the impact of the old preclinical years. Many members of the Class of 1956 felt similarly—how could the World of Ideas have disappeared so suddenly into a maelstrom of unrelated facts being crammed into one’s brain like the Chinese method of preparing Peking duck by force-feeding young poultry with a pump and plastic tube?

Three of us second-year students began meeting every Friday to drink wine and exchange ideas on how to avoid having our brains become shrunken walnuts. Each of us decided not to share with the others his own preventive measure for this fascinating neurological problem. So imagine our surprise when, in the spring, each of us announced that he was taking a year off from medical school to consume more nutritional brain foods. Lon Curtis ’56 won a fellowship to Europe and the Middle East to delve into history. Bill Ruddick took a Woodrow Wilson Fellowship to study philosophy at Oxford and remained there for his doctorate, never returning to HMS. I won a Frederick Sheldon Traveling Fellowship to the South Pacific and Africa and have kept international health as a hobby ever since.

Our experience exemplifies how some classes earlier than the 1960s and 1970s dealt with the problem of the stifling, overly factual, idea-impooverished, mind-desiccating first two years of the old curriculum.

PAUL H. ALTROCCHI ’56
KANEHOHE, HAWAII



would be on a pass/fail basis. After we matriculated, though, we learned that the grading system would consist of more levels than simply pass or fail. Having come of age during the rebellious and anti-establishment era of the late 1960s and early 1970s, we found this turn of events unacceptable.

Discussion with the administration about this issue proved less than fruitful. If I recall correctly, Dean Robert Ebert, in a meeting with the entire class in one of the amphitheatres, reminded us that out there in the real world was a plethora of potential students who would gladly fill our slots, a notion that did not sit favorably with us. So we decided to stage a boycott.

During the physiology final exam, which was the first test that would be graded using the disputed new system, we would substitute numbers in place of names on our papers, with the decoding key being held by a neutral faculty member or administrator. The idea was that any student receiving a failing grade on the exam would be honor bound to reveal his or her identity to the course’s faculty. Those who received a passing grade were under no such obligation, and the faculty would have to assume we had all passed. The resulting compromise was a grading system that had more levels than simply pass or fail but fewer levels than the School had planned.

Our boycott did have one unintended and regrettable consequence: Clifford Barger ’43A, the head of the physiology course, mistakenly believed the boycott resulted from discontent with him and the physiology course. We reassured him that the purpose of this action was solely to remedy the situation with the School’s grading system.

This recounting is based on my memory of events that occurred decades ago, so I encourage those of you with better memories or more knowledge to make any corrections or additions.

MASSAD GREGORY JOSEPH ’77
SOUTH PASADENA, CALIFORNIA

Decoder Ring

I enjoyed reading “Endnotes” in the *Bulletin’s* special report on medical education. At the end of the piece, the author noted that the course syllabus the faculty provided was called a “camel” because it reflected “an organism designed by a committee.” The definition of the “camel” I was given when I attended HMS, though, was “a horse designed by

a committee.” In my humble opinion, that is a more insightful—and pleasingly amusing—description of the beast.

The piece’s recounting of the curriculum rebellion of 1966 reminded me of what we might call the “grading boycott of 1973,” which members of the Class of 1977 perpetrated. As I remember it, we had been told during the application process and before our matriculation in 1973 that all grading

Scrabble Game

The “Endnotes” article in the Spring/Summer 2007 issue of the *Bulletin* about the lecture service brought back memories.

In September 1950, a number of us were sitting in Dave Poskanzer’s room in Vanderbilt Hall—I believe Frank Austen ’54 was there—discussing the absurdity of every student frantically scribbling notes. We decided to ask for three volunteers in each course to take notes and then combine them into coherent sentences. Fortunately we found someone in the dean’s office to

type them up and make mimeographed copies for the entire class.

The plan worked surprisingly well—except Frank consistently did better on exams than I did!

JIM UPSON ’54
ORCHARD PARK, NEW YORK

Simply the Best

When Judah Folkman ’57 died suddenly on January 14, the Harvard Medical School community suffered a devastating loss. Although he was best known for his

scientific discoveries, Judah actually centered his work on patients. Kindness, humanity, and curiosity were at the core of his life.

I first got to know Judah when he was a fourth-year HMS student working in a dusty corridor of what was then Peter Bent Brigham Hospital. He was doggedly trying to transplant kidneys into rats; later he and I often chuckled over that memory, as his lack of proper instrumentation made it an exercise in futility.

After graduating magna cum laude and completing a surgical residency at Massachusetts General Hospital, Judah worked with Bill McDermott ’42 at Boston City Hospital. Later, when he started his own practice at Children’s Hospital, Judah instituted a policy of giving his home phone number to patients. He also carried a notebook of their numbers when he traveled.

As a teacher Judah was magnetic, and his lectures were always crowded. When necessary he could be firm. He once warned medical students, “You have chosen a service profession. Get used to it. If you don’t like long hours, coping with patients, and being on call, then do something else. You could be a banker.”

My golden years with Judah were at Children’s Hospital when he was surgeon-in-chief. Driven by his multiple responsibilities, he practically lived at the hospital. At all hours he was considerate to senior staff, residents, anesthesiologists, nurses, and orderlies alike. Nothing could distract him from his goal of giving his best to patients.

During the 1970s, I discussed one of Judah’s papers at the American Surgical Association meeting in Florida. His report on angiogenesis had been typically sparkling. Yet I focused my remarks on his other, equally impressive qualities.

Judah’s outstanding leadership in biological surgical research is known worldwide, I told the association members. But when a person develops a highly visible profile in one phase of his professional life, there is a tendency to

INNOCENCE OF THE DAMNED

I found the article that Anthony Patton ’58 wrote on Augustus Holyoke of Salem, Massachusetts, in the Spring/Summer 2007 issue of great interest, as my ancestors came from Danvers, which was part of Salem.

When I was small, my parents took me to Danvers to celebrate an anniversary of Rebecca Nurse, who was declared a witch and hanged in Salem in 1692. Those in attendance at the anniversary celebration were all Nurse’s direct descendants. My cousin, a local historian in Danvers, ended up writing a book about Nurse and her persecution.

One time my father, who was a doctor in Hanover, New Hampshire, went to a meeting on diabetes with Elliott Joslin, a member of the Class of 1895 and the founder of the Joslin Diabetes Center in Boston. My father took me along on the trip, but I had to sit out in the car. I later asked him what they had discussed, and he replied that they had talked about ancestors.

ROWLAND FRENCH ’43B
EASTPORT, MAINE





PARADE OF ROSES: Lois Hunter, a 1956 graduate of the Children's Hospital School of Nursing, is third row from bottom, sixth from left.

minimize his other talents. Only those of us working with him daily realize his solid clinical judgment and skills and the extraordinary effect his inquisitive mind has on the daily rounds of all the clinical services of Children's Hospital. Whether his studies lead to the control of cancer or the understanding of arteriovenous malformations, his influence on the thinking and teaching of staff, residents, and students is enormous. He is an excellent clinical surgeon doing outstanding research.

Afterward, Judah thanked me for my remarks, and I was especially pleased to learn that his mother had been in the audience.

It is most satisfying for me to share Judah's attributes with his many grieving friends, colleagues, patients, and fellow graduates.

JOSEPH E. MURRAY '43B
WELLESLEY HILLS, MASSACHUSETTS

A Touch of Honey

My wife and I appreciated the photo of the Children's Hospital nurse and

patient in the Autumn 2006 issue of the *Bulletin*. My experience was similar to that of Henry Work '37, who noted that he had been fortunate to marry a Children's Hospital nurse. I met Lois Anne Hunter, Children's '56, while at Harvard College, and we are celebrating our fiftieth wedding anniversary this year.

While at HMS, I was always impressed with Children's Hospital nurses, and I knew my patients would receive superb care when one of those graduates was on the ward. Shortly after Lois's graduation, Drs. Robert Gross and Robert Smith, who had just begun to perform open-heart pediatric surgeries, asked Lois to take a lead role in establishing the country's first pediatric recovery room. She was successful in this endeavor and was delighted, upon returning several years later, to find that the staff was still using the procedures she had developed.

Once, while I was working as a technician on a research project with Dr. Dav Cook, I had to go to the recovery room to ask my wife whether I could borrow a laryngoscope since the batteries in the

one Cook was using had died. She emphatically told me that I couldn't have it because they might need it for an emergency. My "But, honey" had no effect except to cause smothered laughter among the other recovery room nurses. When I returned to confess my failed mission to Cook, the entire group burst out laughing, and I learned that she had refused them as well.

The Children's Hospital Alumni Association had its final meeting in Boston in 2006, the fiftieth anniversary of my wife's graduation, and many of her classmates attended. I recognize that I am "chronologically challenged," but I regret the evolution from the nurse as a supportive team member to a "nurse manager" role.

ROYCE MOSER, JR. '61
SALT LAKE CITY, UTAH

The Bulletin welcomes letters to the editor. Please send letters by mail (Harvard Medical Alumni Bulletin, 25 Shattuck Street, Boston, Massachusetts 02115); fax (617-384-8901); or email (bulletin@hms.harvard.edu). Letters may be edited for length or clarity.

All the Right Notes

SCALPELS AND STETHOSCOPES AREN'T the only instruments some physicians skillfully wield. When they aren't studying, conducting research, or caring for patients, the forty-odd HMS students and alumni who help compose the Longwood Symphony Orchestra (LSO) still have their hands full—with violins, cellos, and flutes.

The orchestra's roots within Harvard Medical School run deep. Established in 1982, the orchestra was the brainchild of musically inclined HMS students and

professors who wanted to play together. Today, the LSO has 120 musicians, three-quarters of whom are physicians and other health care professionals from area hospitals and medical schools. Two HMS students—Sandy Mong '08 and Sherman Jia '11, both violinists—were appointed co-concert masters for the orchestra's 2007-2008 season.

The connection between music and medicine is an instinctual one for many physicians, says the LSO's president, Lisa Wong, an HMS clinical instructor in pediatrics. "Medicine is based in science, but with practice, you make it an art," she explains. "Music is very similar. Once you perfect the technique, you add the artistry." And like medicine, practicing music requires dedication. "Residents often trade their call schedules so they can perform with us," says Wong, who admits that pagers do sound during practice, but quips that "they go off in tune."

That dedication isn't limited to the stage. In 1991, the LSO cemented its commitment to community service by introducing its Healing Art of Music Program, an initiative to raise funds and awareness for various medical nonprofit organizations. "Rather than simply donating money to these groups, we ask them to purchase blocks of tickets and then work

together to create a unique fundraising event," says Wong. This blend of creativity and collaboration has paid off: Since its inception, the program has helped raise more than \$800,000 for nearly 30 organizations, including the Dimock Community Health Center, Partners In Health, and the Shriners Burn Hospital Boston. The soundtrack for these events is equally varied. LSO conductor Jonathan McPhee, who also serves as music director for the Boston Ballet, enjoys introducing Boston audiences to pieces they may not have heard recently—or ever—such as the twentieth-century Czech composer Leos Janáček's *Glagolitic Mass*.

The program recently expanded its direction in honor of the orchestra's 25th anniversary by offering a series of free daytime symposia on public health issues such as AIDS, global health, and women's rights, with each symposium capped by an evening benefit concert by the LSO. The orchestra capped its latest season with participation in a London symposium on cancer care, including lectures—both of the LSO's trumpeters are oncologists—and a concert.

The 2008-2009 season, which will focus on the role of music and the mind in healing, will feature a concert celebrating the 60th anniversary of Albert Schweitzer's visit to the United States. In planning the program, Wong, a violinist, has considered the powerful effect of Schweitzer's reverence for life on the music and minds of her fellow symphonists. "The way we play changes when we know we're performing for something beyond ourselves," she says. "We don't obsess over hitting every note perfectly; we're thinking about what we're playing for."

For more information, visit www.longwoodsymphony.org. ■

SYMPHONY HAUL: The Boston medical community has yielded a trove of musical talents, including violinist Lisa Wong, president of the Longwood Symphony Orchestra, and violist Nicholas Tawa, Jr., '81.



PHOTO: TOM KATES PHOTOGRAPHY

Live and Learn

A 46-YEAR-OLD WOMAN ARRIVES at your office complaining of painful, stiff joints that are visibly swollen. She's overweight and fatigued but doesn't exhibit a rash or fever. After taking her history and performing a physical examination, you've narrowed the diagnostic possibilities to osteoarthritis, rheumatoid arthritis, gout, or fibromyalgia. Which is she most likely to have?

Medical mysteries like this form the basis of CME Online, the distance learning program of Harvard Medical School's Department of Continuing Education. And now, thanks to the initiative and efforts of the Harvard Medical Alumni Council, such opportunities for lifelong learning are not only easily accessible for HMS graduates, but more affordable as well. In agreement with the Council, the department is offering alumni significant discounts on its online courses, its live courses, and its primary care medicine programs.

For 40 years, the department has offered quality continuing medical education programs that have earned international renown. More than 60,000 clinicians participate in the department's live courses, conferences, or online programs each year. In 2003, the department launched CME Online, which allows health professionals to learn from peers around the globe without ever leaving their desks. In the five years since it was established, CME Online has enrolled 7,000 people from at least 110 countries.

With the goal of providing health professionals with tools to help them optimize patient care, the department's programs present the most up-to-date medical information and strategies for physicians and other health professionals. The courses pertain to all medical disciplines and cover a range of topics relevant to the science, practice, and teaching of medicine.



Special Offers to HMS Alumni

THANKS TO THE HARVARD MEDICAL ALUMNI COUNCIL, HMS GRADUATES CAN NOW enjoy special discounts on Department of Continuing Education programs, including:

Online Courses. The department offers several dozen online courses through CME Online, with many others under development. HMS alumni are eligible for a 50-percent discount on these courses.

Live Courses. HMS alumni receive a 15-percent tuition discount on live courses. To be eligible, they must register at least 60 days before the start of the course.

Primary Care Medicine Programs. The department has waived registration fees for HMS alumni enrolling in any of its seven Current Clinical Issues in Primary Care Medicine programs throughout the United States and in Mexico. Alumni are also welcome to make themselves at home in the HMS speakers' lounge, where they can meet with keynote speakers and other colleagues over breakfast and lunch and throughout the sessions. ■

To learn more about these offers, visit <http://alumnibulletin.med.harvard.edu/resources/benefits/cme.php>

CME Online offers a variety of approaches to learning. The computer-based program includes interactive quizzes, laboratory results, photographs, and other related images that bring clinical cases to life and make learning enjoyable. Clinicians can choose from a range of topics, such as "Management of Atrial Fibrillation," "Endocrine Emergencies," and "Clinical Challenges in Toxicology."

Each module contains a compelling case study that presents a patient's symptoms—in one case, a 58-year-old woman with a history of breast cancer experiences back pain; in another, a 23-

year-old man exhibits stomach distress, depression, and fatigue—and questions users on the appropriate tests, diagnoses, and treatments. In addition to offering an interactive question-and-answer format, the program allows readers to compare their answers with those of their peers and to email the module's author for more information. And the "save as you go" function makes it easy for busy clinicians to pursue credits at their own pace.

For more information about the Department of Continuing Education, visit its website at <http://cmeonline.med.harvard.edu>. ■

Easing the Debt Burden

AFFORDING A TOP-QUALITY MEDICAL EDUCATION IS about to get easier for many HMS students. Dean Jeffrey Flier recently announced a new financial aid initiative aimed at reducing debt for medical students and their families. The School has approved a significant decrease in the financial contribution expected from families earning \$120,000 or less annually—a reduction estimated to save each family approximately \$50,000 throughout the traditional four-year program. This policy revision will affect about one-third of HMS students.

Formed in part by the School's Strategic Advisory Group on Education, the initiative comes as levels of student debt reach new heights. With rates of indebtedness rising more quickly than starting salaries in many areas of the profession, medical students often feel pressured to choose more lucrative specialties. Minimizing this pressure, says Flier, will help students make career

decisions based on their interests and abilities rather than on financial concerns.

Scheduled to begin with the 2008–2009 school year, the initiative will result in the awarding of an additional \$3 million in HMS scholarship funds, a nearly 40 percent increase over current funding levels. It will also exclude parents' retirement savings from the eligibility equation, allowing a larger number of families to qualify for financial support. And the Strategic Advisory Group on Education has joined with the Program in Medical Education and the Committee on Financial Aid in studying the feasibility of replacing some of the School's current subsidized federal and institutional loans with scholarships.

"The issue of student debt is of great concern to me, which is why I feel particular satisfaction with this first step toward making HMS more affordable," Flier says. "It is important that the School not be out of reach to a broad segment of undergraduate students and their families." ■

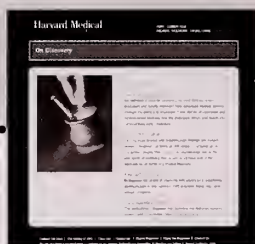
Connecting the Docs

THE HARVARD MEDICAL ALUMNI BULLETIN has launched a website aimed at better connecting HMS graduates with one another and with the School.

In addition to a continually expanding selection of *Bulletin* archives, the website offers three sections that curate the magazine's features: "Fascinoma," which borrows from medical slang to collect articles on such topics as music and medicine, history's medical mysteries, and white coat humor; "On Doctoring," which presents articles in areas of interest to working physicians; and "On Discovery," which captures the research findings of Harvard doctors.

Other sections include "Alumni Resources," which highlights benefits the School offers its graduates (such as continuing medical education discounts and financial aid programs), and "Connect the Docs," which provides links to alumni websites and blogs; news and features about alumni; and plot synopses of past Second Year Shows.

The *Bulletin* website can be found at <http://alumnibulletin.med.harvard.edu>. Please send us links to alumni websites and blogs, information about published books that should be added to our online bookstore, lyrics or links that will enrich the Second Year Show archive, and any suggestions you may have. ■



Lesson Plans

WHETHER RAPPING THEIR WAY through anatomy class or exploring an imaginary island, the Class of 2010 proved that HMS students have brains *and* talent in their production of the 101st annual Second Year Show. Directed by Andrew Chao and Camille Powe, *All I Really Need to Know I Learned in Medical School* cleverly skewered the class's experience as guinea pigs of the new integrated curriculum—with song, dance, and witty dialogue.

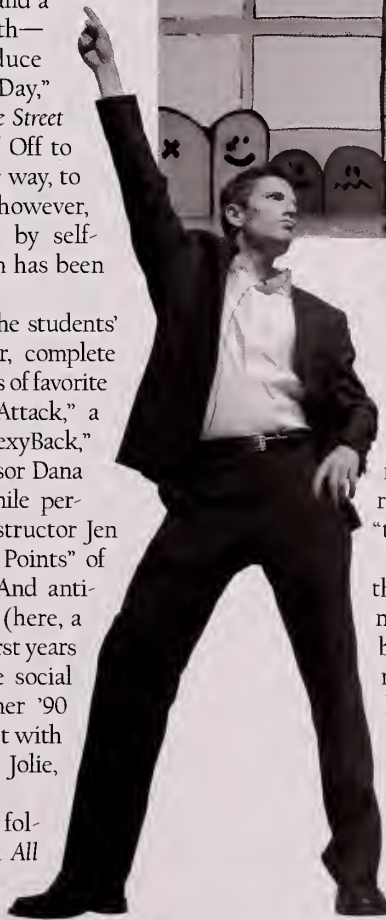
The show unfolded as a collection of earnest first years—an overeager pediatrics student, an awkward social medicine groupie, a geeky Health Sciences and Technology student, an insensitive cultural competence advocate, and a dental student with bad breath—arrive on campus and introduce themselves with “Our First Day,” sung to the tune of the *Sesame Street* theme song (It’s our first day / Off to learn the Harvard way / On our way, to where we fight disease). Soon, however, the students become plagued by self-doubt as they learn one of them has been admitted to HMS by mistake.

The opening act focused on the students’ journey through their first year, complete with the usual merciless send-ups of favorite preclinical instructors. “Heart Attack,” a spoof of Justin Timberlake’s “SexyBack,” let muscle-bound surgery professor Dana Stearns show off his biceps while performing CPR. Perky biology instructor Jen Stanford summarized the “Key Points” of the show at various intervals. And anti-tobacco crusader Allan Brandt (here, a chain smoker) transported the first years to a make-believe island where social medicine superstars Paul Farmer ’90 and Jim Kim ’86 were camped out with Hollywood superstar Angelina Jolie, there to adopt her 17th child.

The show’s theme loosely followed Robert Fulghum’s book *All I Really Need to Know I Learned in Kindergarten* by highlighting life



GETTING THEIR KICKS: Alexis Moore and Dan Drzymalski get into the swing of things during the Dance Off of Doom (above), while Steve Porter (as Paul Farmer) strikes a pose.



lessons applicable to both kindergarten and medical school, such as apologizing when you hurt someone. The show was infused with bits of comedic inspiration, including a suspiciously sniffing Big Bird—recently returned from Southeast Asia—and a series of amusing “training films” about the patient-doctor relationship.

The most memorable feature of the show, though, was the Class of 2010 itself. As the Health Sciences and Technology student, for example, Marc Walker used impeccable comic timing to deliver such lines as, “I can’t wait to meet a patient. And then maybe when I finish my PhD, I’d like to meet another one.” And Ashley Orynrich, as the dental student with halitosis, gave a sultry rendition of “It’s Not that Easy Lovin’ Teeth,” set to the tune of Kermit the Frog’s “Bein’ Green.”

And who was the mistake? No one, of course, because HMS faculty would never make a mistake. They were simply trying to teach the students an “integrated life lesson.” ■

Sickness, Wired



CHOLERA, SMALLPOX, AND other contagious diseases are now just a few keystrokes away. Their presence, thankfully, is virtual, part of a comprehensive new digital library collection made possible by the Francis A. Countway Library of Medicine and other Harvard-affiliated libraries.

The online collection, *Contagion: Historical Views*

of Diseases and Epidemics, documents the scientific, historical, and social forces behind the development of contagion theory and modern epidemiology and details several "disease episodes," including epidemics of syphilis, cholera, plague, yellow fever, influenza, and smallpox. Visitors to the project's website have access to thousands of relevant materials, including digitized copies of books, serials, pamphlets, incunabula, manuscripts, and illustrations. The Countway's many contributions include unique resources: a letter from Thomas Jefferson to Benjamin Waterhouse discussing inoculation against smallpox; the first printed medical book to contain illustrations; and graphic works by such notable caricaturists as George Cruikshank and William Hogarth.

Contagion, which was created by the Harvard University Library Open Collections Program, can be accessed at <http://ocp.hul.harvard.edu/contagion>. ■

A Man of Vision

IT SEEMS ONLY FITTING THAT MARK HUGHES '86, CHAIRMAN OF THE Alumni Fund, should succeed the acting chair, Daniel Federman '53. After all, Hughes played Federman in his class's Second Year Show, "The Right Stiff." Federman now likes to introduce the new chair by telling a story about a secondary role Hughes played with the show.

"As a student," Federman says, "Mark visited Carl Walter '32, the founding chair of the Alumni Fund, to solicit Carl's annual gift to the Second Year Show. Mark came away with a doubled gift and Carl's prediction that HMS would get a lot out of Mark in the long run. That long run begins now."

Hughes maintains an ophthalmology practice in which he specializes in retinal disease. An early adopter of angiogenesis inhibition for macular degeneration, he has been widely published in the areas of ophthalmology and professional standards in medicine. ■

Gained in Translation

HARVARD MEDICAL SCHOOL HAS received a five-year Clinical and Translational Science Award from the National Institutes of Health to launch a center that will transform patient-oriented research and create an unprecedented level of collaboration across the Harvard schools and affiliated hospitals and institutes. With this award, the University will join a consortium of clinical and translational science centers based at academic health institutions around the country.

The Harvard center will be directed by Lee Nadler '73, the Virginia and D. K. Ludwig Professor of Medicine at the Dana-Farber Cancer Institute and HMS, and co-directed by Steven Freedman '73, HMS associate professor of medicine at Beth Israel Deaconess Medical Center. HMS will receive \$23.5 million annually during the five-year period. The School, University, and affiliated hospitals have also joined together to contribute an additional \$15 million to the effort.

"This is an extraordinary moment for our University, our School, and all of the hospitals and institutes that make up the Harvard Medical community," says Jeffrey Flier, dean of HMS. "The grant application required an unprecedented level of collaboration across our community, as well as a commitment to a broad and compelling vision of clinical and translational research at Harvard."

Among the initiative's key strategies will be to improve communication across the University and to help clinical investigators locate tools, equipment, collaborators, and expertise throughout the Harvard system. "Thanks to the efforts of Jeff Flier and Lee Nadler," says Steven Hyman '80, provost of Harvard University, "we'll be able to put together a bench-to-bedside translational and clinical research effort that will make the Harvard medical system bigger and more effective than the sum of its storied parts." ■

IMAGE COURTESY OF THE HARVARD MEDICAL LIBRARY IN THE FRANCIS A. COUNTWAY LIBRARY OF MEDICINE



The Strongest Link

IN THE JUNE 1928 ISSUE OF THE *BULLETIN*, JOSEPH Garland, a member of the Class of 1919 and the magazine's founding editor, begged the School's graduates to send news of themselves. "Our column of Alumni Notes, brave enough a few months ago," he wrote, "has shrunk now to such proportions that we wonder if the graduates of the Harvard Medical School are entirely inactive in the arena of life, never even changing their addresses, or if modesty or fear of their local committees on ethics and discipline prevents them even from announcing through our columns that little Mary Jane has come to gladden the hearts of both parents. The editor is tempted—almost—to insert his own name with the news that he has not bought a new fountain pen because the old one is still working."

"Connect the Docs," or a newly available alumni resource—and offer other relevant information, including details about upcoming reunions and news about individual alumni.

We also envision an e-community with even greater potential, one that will help us foster such initiatives as the cultivation of mentoring relationships between students and alumni, a clearinghouse of alumni willing to host students interviewing for residencies outside of Boston, an exploration of service opportunities, and a forum for discussions on important issues in health care and medical education.

My successor as president, Steven Weinberger '73, shares my interest in building this alumni interaction space. We hope that our work in developing online connections will prove as successful as several other recent Alumni Council initiatives. When Steven Schroeder '64 served as president, for example,

We also envision an e-community that will help us foster such initiatives as the cultivation of mentoring relationships between students and alumni.



Eighty years later, we find ourselves making the same plea for alumni to stay in touch with the School—and with each other. But we now have communication tools far more elaborate than Garland's trusty fountain pen, and we are hoping to exploit them to bring members of the Harvard Medical School community a little closer to one another, no matter their geographic address.

During my tenure as president, I have worked with Council members to establish a virtual community of HMS alumni. A year ago the Harvard Medical Alumni Association redesigned and reinvigorated its website, and now the *Bulletin* has an online presence as well. We have been working with Post.Harvard, the University-wide alumni website, to create additional avenues for communication. These websites are a good beginning; not merely a database, each has been designed with the goal of bringing alumni together. The *Bulletin*'s "Connect the Docs" section in particular is aimed at forging links among alumni, faculty, and students.

But these websites represent only a sliver of what we hope to provide. We plan to launch an e-newsletter, for example, that will bring content updates to interested alumni—such as the online availability of the latest *Bulletin*, innovations in

he brought his passion and energies to bear on the issue of student debt, and the Council helped spark renewed attention to relieving the financial burden on HMS students. And last year, A. W. Karchmer '64 led the Council in working with Sanjiv Chopra, the faculty dean in the HMS Department of Continuing Education, to develop some terrific continuing education benefits for HMS alumni.

Although these legacies serve to define the contributions of past presidents and Council members, the issues they tackled were ones that drew on the concerns—and wishes—of many alumni. We believe our efforts to pull graduates together using today's communication tools also respond to those needs and hopes by helping alumni remain grounded in their profession and linked to their classmates while they circle the globe on their missions of healing. ■

William W. Chin '72 is vice president for discovery research and clinical investigation at Eli Lilly and Company.

The Bulletin's website can be accessed at <http://alumnibulletin.med.harvard.edu>; to learn more about the Harvard Medical Alumni Association, visit www.hms.harvard.edu/alumni.

Deliver the Goods

DECADES HAVE PASSED, YET THE CONVERSATION STILL resonates with Donald Berwick '72. "Joanne's story was a turning point for me," he says. "It showed me our approach to health care reform was bankrupt."

Joanne, an administrator in a radiology department at Harvard Community Health Plan, had sent Berwick data showing that in a three-month period, her department had slashed patient waiting times from an average of 45 minutes to 2 minutes. Berwick simply had to know the details behind her success. So he had gone to her office.

"Joanne, you've knocked the socks off this problem!" he exclaimed. "What did you do?"

Joanne looked at him: "It was easy. All I did was lie."

Color Coded

At the time, Berwick was the group's vice-president for quality-of-care measurement. Joanne had sent her data in response to an assessment survey he had circulated. From Berwick's shocked expression she knew a fuller explanation was needed.

"Let me tell you what happens around here," she said. "When I send you data that shows all the problems, you send that to my boss's boss's boss, and he circles it with red ink. Then he sends it to my boss's boss, and he circles it in yellow marker and sends it to my boss, who circles it in orange ink and writes, 'Joanne, do something about this.' It then comes back to my desk—as if I didn't know we had a problem and wasn't already doing everything I could to resolve it. So I made up the data. I knew both you and I would be happier if I did."

Her story opened Berwick's eyes. "I saw that so long as we kept beating up the workforce," he says, "so long as we just kept asking good people to try harder to fix chronic issues, we'd never, ever get going. This upended my whole way of thinking."

Berwick, a clinical professor of pediatrics and health care policy at Harvard Medical School, has dedicated himself to changing the way people approach health care improvement. He believes he has struck upon a better way to work for the Joannes out there—and for all the patients she and so many other health care professionals seek to serve while operating within a hobbling system. In his approach, problems associated with the practice and delivery of health care—problems like medical errors, waste, and a systemic inability to look inward and learn—are dissected as problems of process, not of people. And, taking a page from industry's push to improve productivity, workplace morale, and product quality, he encourages the health care industry to follow a new paradigm.

With searing clarity, Berwick points out the flaws of the health care system and analyzes how they can be overcome

through redesign. He and the growing legion of hospitals and health professionals that work with him have shown that specifying processes and streamlining systems can avoid needless deaths, alleviate pain and suffering among patients, eliminate waiting and waste, and help banish the helplessness that patients and their families too often experience.

Most health professionals are painfully aware of the need for improvement. If they aren't, numbers might help convince them. A patient safety study conducted between 2004 and 2006 by HealthGrades, a health care ratings organization, presented data on the costs of medical errors gleaned from an analysis of 41 million records of Medicare patients. Its findings showed that patient safety errors resulted in nearly a quarter of a million preventable deaths during the period studied. It further found that more than 60 percent of the common medical errors reported involved bedsores, failure to save patients once complications arose, and postoperative respiratory failure. With fewer such errors, the study analysts estimated thousands of lives and up to \$2 billion in outright costs could have been saved.

Industrial Strength

The idea for applying the principles of what is known as continuous quality improvement to the service-based industry of health care came to Berwick in the mid-1980s, soon after Joanne had confessed the secret behind her success. Berwick had registered for a weekend lecture series in Washington, DC, featuring W. Edwards Deming, a mathematical physicist who had successfully applied statistical methods to industrial quality control questions. Largely unused in the United States, Deming was a hero among Japan's industrialists who had used his theories to propel that nation's postmodern economic boom.

"For the first day and a half," says Berwick, "I sat there listening to Deming explain his statistics-based, engineering-based theory for how proper management should work to achieve continual improvement. By noon of the second day I had left and flown back to Boston. I thought it was all nonsense."

But the night of his return proved to be a restless one for Berwick. Agitated, sweating, and unable to sleep, he wandered into his living room and sat down to think.

"Suddenly it hit me," he says. "I realized my discomfort wasn't the result of my being exposed to a theory that was wrong. I was uncomfortable because what I had heard made sense to me—and it violated almost every theory that I had been following. I returned to DC and completed the seminar."

Berwick walked away from this epiphany with an idea for fixing health care that was unlike almost anything that had yet been tried. In 1987, his innovation led to a role as co-principal

investigator on an experiment known as the National Demonstration Project on Quality Improvement in Health Care. Teaming with A. Blanton Godfrey, who was then a quality management theoretician with Bell Laboratories, Berwick set out to test whether methods used to improve industrial quality were applicable to health care. Berwick and Godfrey matched 21 professionals from health care organizations with a similar number of industrial quality assurance professionals from academia and industry.

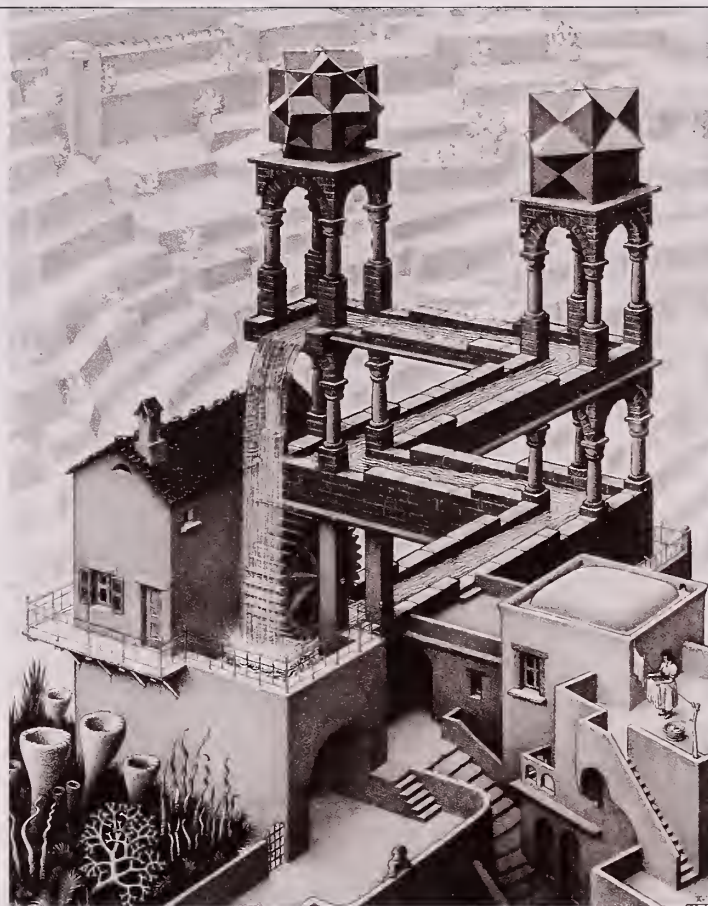
After 18 months of work, the groups reported their results on projects ranging from better billing procedures to improved ways of transporting infants between hospitals. The results were so stunning that the study sponsors granted the investigators funding for three more years. The researchers used the time to establish a network of hospitals that shares information on implementation efforts, to inaugurate forums on quality improvement in health care, and to develop courses on how to adapt industrial quality improvement methods to health care.

To spread the word further, in 1989 Berwick wrote a commentary for the *New England Journal of Medicine*. The title, "Continuous Improvement as an Ideal in Health Care," only hints at its true purpose: It is at heart a manifesto declaring the need for the profession to look anew at itself and its approach to improvement. Berwick outlines why an approach that blames problems of quality on workers' poor intentions only serves to make people game the system—distort the data, fault others for perceived shortcomings, and fearfully avoid anyone associated with quality measurement and improvement.

On the other hand, Berwick points out, if problems with quality are seen for what they truly are—fundamental flaws of a complex system—they can be understood and revised on the basis of data about the processes themselves, not the people implementing them. The potential for improvement in quality is nearly boundless, Berwick says, if we remove fear from the equation, learn from accurate information, and enlist the talents and spirit of dedicated professionals.

All Ahead Full

The principles set forth in his article are ones Berwick applies in practice. In his work at the Institute for Healthcare Improvement, a not-for-profit organization in Cambridge, Massachusetts, that he helped establish in 1991, Berwick has focused on fixing health care systems in the United States and abroad. One of the institute's more visible efforts launched in 2004 when it began a campaign to improve hospital safety. The 100,000 Lives Campaign was designed to help hospitals reduce unnecessary deaths by encouraging

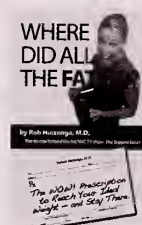
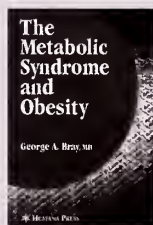
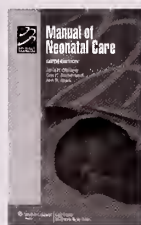
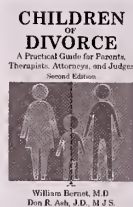
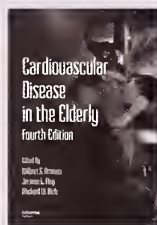


them to implement over a two-year period a handful of scientifically proven improvements in care delivery, such as rapid response teams for critical care interventions, the prevention of surgical site and central-line infections, and the reduction of medication errors.

The campaign exceeded its goal: Hospitals participating in the campaign and in other initiatives prevented an estimated 122,300 unnecessary deaths within an 18-month campaign period. In December 2006, the Institute for Healthcare Improvement launched a second such effort, this time with a goal of preventing five million incidents of medical harm in the United States.

With initiatives to transform medical and surgical care, perinatal care, clinical office practice, surgical outcomes, and a host of other improvements, the work of Berwick and his team is steaming ahead. Berwick knows, though, that the task is great and that protracted implementation means more lives lost, more frustrated health professionals, and a continued escalation of costs in an increasingly inequitable health care system. Incremental change, he feels, is not the answer. Instead he believes the U.S. health care system needs fundamental change. And if that means building it anew, well, Berwick may just be the one to spark that transformation. ■

Ann Marie Menting is associate editor of the Harvard Medical Alumni Bulletin.



Cardiovascular Disease in the Elderly

edited by Wilbert S. Aronow '57, Jerome L. Fleg, and Michael W. Rich (Fourth edition, Informa Healthcare, 2008)

People older than age 65 currently account for more than 80 percent of all cardiovascular disease-related deaths. The updated version of this classic textbook provides a comprehensive yet readable overview of the epidemiology, pathophysiology, evaluation, and treatment of cardiovascular disorders in this population. The book offers an in-depth discussion of the elderly patient in the clinical setting and considers the impact of coexisting conditions, polypharmacy, frailty, and patient preferences on cardiovascular disease management.

Children of Divorce

A Practical Guide for Parents, Therapists, Attorneys, and Judges, by William Bernet '67 and Don R. Ash (Second edition, Krieger Publishing, 2007)

Because every divorce has social, psychological, and legal implications, this guide speaks to all the major players—parents, therapists, attorneys, and judges. The expertise of both psychiatric and legal professionals is presented, and the book offers readers advice to achieve three basic goals: to help children maintain good relationships with both parents; to help children continue to maintain their regular routines; and to help children learn how to accept inevitable losses and disappointments and then move on.

Manual of Neonatal Care

by John P. Cloherty, Eric C. Eichenwald '84, and Ann R. Stark '71 (Sixth edition, Wolters Kluwer, 2007)

This revised volume offers a practical approach to the diagnosis and medical management of problems in newborns. The book contains new information on fetal assessment, new guidelines on the management of neonatal jaundice, and updated data on the survival of premature infants and perinatal asphyxia. Intubation and sedation guidelines and an easy-to-access guide to neonatal resuscitation are also included.

The Metabolic Syndrome and Obesity

by George A. Bray '57 (Humana Press, 2007)

Bray's survey of the current scientific understanding of obesity and the metabolic syndrome also includes an overview of the most significant changes in the field during the past 30 years. This comprehensive reference addresses the problems and offers solutions. Treatment options such as diet, exercise, behavioral therapy, surgery, and pharmaceuticals are also discussed.

Where Did All the Fat Go?

The WOW! Prescription to Reach Your Ideal Weight—and Stay There, by Robert Huizenga '78 (Tallfellow Press, 2008)

Based on new obesity research, this book provides readers with the same

successful diet and exercise program the author offers as the doctor for the NBC television show *The Biggest Loser*. He also addresses the psychological aspects of obesity and weight loss, including depression, temporary setbacks, emotional problems, and pitfalls and barriers.

Manual of Pediatric Therapeutics

by David S. Greenes '91 (Seventh edition, Wolters Kluwer, 2008)

Based on the experience of clinicians at Children's Hospital Boston, this practical, point-of-care reference contains current information on topics such as acute care, behavioral disorders, and management of children with developmental disabilities and other specialized health care needs. An A-to-Z drug formulary is included.

Lifting the Weight

Understanding Depression in Men, Its Causes and Solutions, by Martin Kantor '58 (Praeger Publishers, 2007)

Long thought of as a "feminine" disorder, depression actually affects millions of men each year. In this jargon-free text, Kantor focuses on the human dimension of depression as it appears in men, emphasizing the "microscopic doings of the depressed man's inner and outer life." He takes a holistic approach, melding various schools of thought with his clinical experience. The author also includes a chapter on how to cope with men who are depressed.

8 Weeks to Optimum Health

A Proven Program for Taking Full Advantage of Your Body's Natural Healing Power, by Andrew Weil '68 (revised paperback edition, Ballantine Books, 2007)

MY CHILD—LIKE YOURS—IS PERFECT IN EVERY WAY, except that she does not take my advice. For reasons I fully understand (yet cannot fully accept), she will not look to my years of culled professional knowledge and life experiences to guide her physical and mental health. There is no glow of the follower in her loving eye. She would rather suffer and learn on her own. She is still young.

Lucky Andrew Weil '68. He has followers eager to learn from his knowledge and experiences. Perhaps this has caused a certain confidence. "If," he writes in his revised and expanded *8 Weeks to Optimum Health*, "you are motivated to read this book and begin the program, you need no other outside help." A lovely idea it is.

Readers of the *Bulletin* and *O, The Oprah Magazine* already know Weil as an expert in integrative medicine, a prolific writer, and a personality with a strong and jolly twinkle in his media-sensitive eye. The book is intended as a guide for the general audience. Each week, Weil assigns homework: one new project (purify the water, lean toward organic produce); one new piece of dietary advice (add salmon, soybeans, green tea); one new supplement; sequential walking and breathing techniques; and one spiritual recommendation (buy flowers, visit a park). There are also optional exercises—extra credit for the soul—and recipes. Two hundred and sixty-four pages boil down to this counsel: be good to yourself and others. The rest is merely detail.

When the first edition of the book emerged a decade ago, this advice, especially the details, seemed revelatory. It is in part the result of Weil's efforts that most of his guidance now seems merely sensible. Alternative and integrative treatments are pro forma; Harvard itself has a whole division dedicated to their research and practice. And the influence of mind upon body is also indisputable, as Weil's work has helped show.

His special interest is the healing system, which, he explains, is not structural but functional. It is more inclusive than the Western medical model, expanding to include soma,

psyche, and spirit, and operating from the level of DNA "up to the level of cut fingers, and into the mental realm, where it helps us adjust to emotional shocks." This is the kind of philosophy you either believe or you don't.

To illustrate its potential, Weil begins his book at his own beginning: an overweight, over-burdened person. His diet was "free form and thoughtless." His mind was "restless [and] susceptible to boredom." He suffered from hives, migraines, and sunburns. The treatment he needed was not medicine but a lifestyle adjustment. He made that adjustment and now offers the same treatment to others. "Patients come to me with stories of woe," he explains, "and instead of giving them magical cures, I tell them they must change their diets, habits of exercise, ways of handling stress, even their breathing."

The testimonials in each chapter are not as interesting as Weil's writings about alternative treatments. His chapter on tonics includes wonderful descriptions of herbs with poems

for names (ashwagandha and cordyceps) and an unexpected endorsement of aspirin. He informs us that more than 400 compounds contribute to ginger's smell, taste, and biological activity, and that coenzyme Q₁₀ should be taken with a fatty meal to increase bioavailability. This information is useful, at least to the believer.

But the program has some problems. Some of the advice is dated (ginseng has seen better days). Also, it is easiest for those followers with both feet on firm financial ground. In the shelters where I work, patients cannot afford many of Weil's suggestions, including wild Alaska salmon, saunas, and hypnotherapists. And while I am quibbling, there is something about a recipe for "Dr. Andrew Weil's Favorite Low-Fat Salad Dressing" that sends a rebel straight to the high-fat salad dressing section of the supermarket. Too much first person can bring out unspiritual and belittling tendencies in a reader. This is a shame, as the book was written for my own good.

As I finish this, my daughter is refusing my suggestions for organizing her fourth-grade homework folder—again. It could use help. Her refusal does not discourage me, since I am never tired of giving advice. Interestingly, though, I'm sometimes tired of getting it. ■

Elissa Ely '88 is a psychiatrist at the Massachusetts Mental Health Center.



Adjusted to Fit

COXING THE BODY TO TOLERATE transplanted tissue usually depends upon chemical inducements. These pharmaceutical aids can be taxing, though. For one thing, the transplant recipient must take the immunosuppressive drugs for the rest of his or her life. Yet even with perfect adherence, the drugs can fail in their task, leading the patient's immune system, unconvinced of the merits of the new tissue, to reject the transplant.

Research from a team at Massachusetts General Hospital, however, may have struck upon a way to ensure tolerance of kidney transplants without the long-term assistance of immunosuppressive drugs. The team's innovation relies on a quick succession of therapies that trick the immune system into accepting the new tissue as friendly rather than

foreign. And perhaps most promising of all, the method is the first to work for patients and donors who were immunologically mismatched, a situation that can complicate transplantation efforts.

The senior researcher for the MGH team was David Sachs '68, the Paul S. Russell/Warner-Lambert Professor of Surgery and director of MGH's Transplantation Biology Research Center; the team also included Nina Tolkoff-Rubin '68, a professor of medicine and director of hemodialysis at the hospital. Their report appeared in the January 24 issue of the *New England Journal of Medicine*.

Preparation Is Everything

The team designed the study with pre- and postconditioning routines that they hoped would create a temporary state

in which bone marrow stem cells from the donor would mix easily with those of the patient. The stem cells in a person's bone marrow spawn an array of other cell types that populate the body's immune network.

In the chimeric state the researchers sought to induce, the bone marrow stem cells of the patient would form an alliance with introduced bone marrow cells from the donor. The mixed cells could then work to broker an amiable coexistence between the new tissue and the body's immune sentinels. If all went well, the patient's immune system would be tricked into accepting the donor kidney forever.

To ease this transition, the team preconditioned each patient with a regimen that used chemotherapy to partially destroy patients' bone marrow; an antibody to disable immunologically active T cells, which form in the thymus; and irradiation of the thymus to further suppress T cells. After transplantation and an infusion of donor bone marrow, patients were isolated for two weeks in a sterile room to allow cells in the bone marrow and the immune system to regenerate.

The team enrolled five patients with end-stage renal disease who were scheduled to receive a kidney from an immunologically mismatched parent or sibling. The first two patients responded well to the preconditioning, transplantation, postsurgical isolation, and a nine- to fourteen-month weaning from immunosuppressive drugs.

A third participant, however, rejected the transplanted organ and had to undergo a second transplant. This rejection might have clouded the team's effort had they not discovered the patient's B cells had rallied to fight the new organ's presence. In most cases, B cells, which develop in the bone marrow, depend on T cells to activate. In this patient, reactive B cells may have already existed.



Weapon for Mass Construction



By revising the plan to include a B-cell-depleting antibody in the preconditioning protocol, the team used the regimen successfully for the final two participants. Of the four patients for whom the study regimens worked, all have had stable renal function for two to five years.

“This marvelous work exemplifies the progress occurring in the field,” says Joseph Murray ’43B. “It is simply mind-boggling the way advances have manifested themselves in the decades since the first solid-organ transplantations.” In 1954, Murray was surgeon for the team that performed the first successful human organ transplant. Four decades later, Murray, together with E. Donnall Thomas ’46, received the Nobel Prize in Physiology or Medicine for pioneering work in the field of organ transplantation.

Matched Set

Across the country, another HMS alumnus has broken new ground in the field. Samuel Strober ’65 was senior researcher on a Stanford team that also reported findings on immune tolerance of organ transplants in the January 24 issue of the *New England Journal of Medicine*.

Unlike the MGH effort, the Stanford team focused on transplantations involving matched donors and patients. The study relied on a post-transplantation regimen of lymphoid irradiation and antithymocyte globulin, an antibody that fights tissue rejection by blocking the actions of T cells, to adjust each patient’s immune system to accept the new tissue. After ten days of the regimen, patients were infused with blood stem cells from a compatible donor and a state of persistent chimerism was achieved. Of the six patients in the study, one has been off all immunosuppressive drugs for more than two years.

According to MGH’s Sachs, the studies’ findings could offer patients lives free of the problems—and cost—of immunosuppressive drugs. ■

effects that the drug bortezomib might have on cells known as mesenchymal stem cells (MSCs). Found in bone marrow, MSCs are multipotent; that is, they can develop into any of several types of cells. If triggered during their more impressionable period, they can become bone, fat, muscle, or cartilage cells that can then grow or repair tissue lost to disease or trauma.

The team selected bortezomib because clinical evidence from multiple myeloma patients taking the drug showed elevated serum levels of alkaline phosphatase and osteocalcin, substances linked with bone formation. Hoping to isolate how the drug’s actions might contribute to increased bone formation, the researchers tested possible targets for the drug. Surprisingly, they found it caused MSCs to form bone tissue.

The *in vivo* mouse model the scientists used was one developed for menopausal osteoporosis. When they treated these mice with low doses of bortezomib, doses equivalent to between one-fifth and one-third what would normally be considered effective against tumors, they found an increase in bone formation, in the mineralization of spongy tissue matrices that form the ends of long bones such as the femur, and in the production of osteoblasts, the cells that make up bones. Similar results were achieved when the researchers tested the drug *in vitro* on cultured MSCs derived from human bone marrow and from mouse models.

The authors point out the drug’s potential for people experiencing bone loss. In addition, they note the study offers proof of principle that a drug can harness the inherent power of the body’s stem cells to repair and regenerate tissue—a strategy that might become increasingly key to regenerative medicine. ■

RENOVATION AND RENEWAL OF BONE diminished by age or disease could be just around the corner, according to results from a study by scientists at Massachusetts General Hospital and the Harvard Stem Cell Institute. A team of researchers wrote in the February issue of the *Journal of Clinical Investigation* that a drug used as a targeted chemotherapy in patients with multiple myeloma helped regenerate bone tissue in mice by activating stem cells critical to the formation of new bone tissue.

The findings could represent a novel therapeutic strategy for bone diseases: targeting stem cells using drugs. If so, this news may one day help put the spring back in the step of postmenopausal women who suffer from osteoporosis or individuals who have lost bone mass because of cancer.

The team of investigators led by Siddhartha Mukherjee ’00, an HMS instructor in medicine at Massachusetts General Hospital’s Center for Regenerative Medicine and Technology, set up their study to examine the

Not Even Death Is Certain

IT'S NOT QUITE AS UNIVERSAL AS one might expect. How to determine brain death, that is. Although the American Academy of Neurology (AAN) has weighed in on the subject, a report in the January 22 issue of *Neurology* found many of the nation's top-ranked neurology and neurosurgery centers differ considerably in how they apply the AAN's guidelines. And the researchers found some institutions had no guidelines at all.

The members of the research team designed their study after they became curious about what they viewed as major discrepancies among such policies in certain hospitals. So they set out to gather and compare protocols on brain death determination from 50 hospitals listed high in *U.S. News and World Report's* 2006 ranking of neurology and neurosurgery centers. The team was led by David Greer, an assistant professor of neurology at Massachusetts General Hospital, and included researchers at the Mayo Clinic in Rochester, Minnesota, and the Henry Ford Hospital in Detroit, Michigan.

Their interest, and indeed that of medicine in general, in the issue of brain death has its roots in questions raised in the late 1950s by two French physicians. Their published descriptions of 23 patients in unending comas spawned the concept and gave rise to a definition: the irreversible loss of all brain function while systemic organs remain artificially supported. Equating brain death with standard concepts of death came in a 1981 Presidential Commission on ethical problems in medicine. It stated that brain death was the legal equivalent of such long-accepted measures of death as cessation of heart and lung function.

Currently, most states have enacted what is known as the Uniform Determination of Death Act, which specifies that determinations of brain death be made according to accepted medical standards, be they national, regional, or local. In an effort to create a norm for such guidelines,



in 1995 the AAN published practice parameters based on an evidence-based review of the literature and best practices.

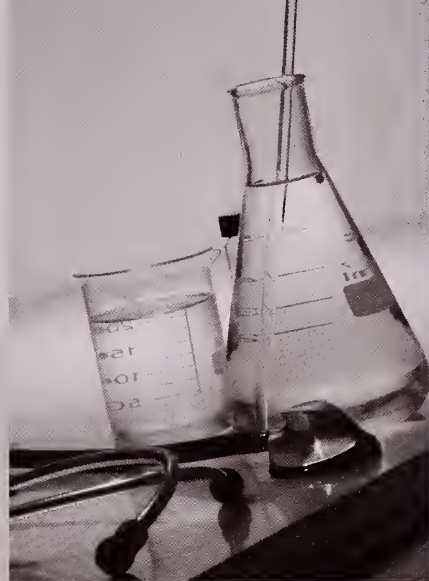
Dead Reckoning

The researchers used five categories of the AAN practice parameters as points of comparison: guideline performance, preclinical testing, clinical examination, apnea testing, and ancillary tests. Among the 41 responding institutions, three had no policy at all. For the remaining 38 hospitals, the researchers found a surprisingly low percentage (42 percent) required either a neurologist or

a neurosurgeon be present during the determination. Of these, only 35 percent required an attending neurologist or neurosurgeon be present.

Nearly three-quarters of responding hospitals required multiple examinations—3 percent sought more than two—while allowable time between examinations varied from 1 to 24 hours, with 6 hours being the most common. More than 95 percent of the responders required preclinical tests but differed widely in what tests they recommended: establishing an underlying cause (63 percent); ensuring the absence of sedatives and paralytics (55 percent); verifying the

Research Digest



absence of acid-base disorders (45 percent); or ensuring the absence of endocrine disorders (42 percent).

Although apnea testing was missing from one group's guidelines for clinical examinations, guidelines that did include it stipulated a variety of techniques for such testing. Lowest acceptable temperature, for instance, was specified in only 26 percent of the guidelines; 66 percent required an arterial blood gas prior to testing; and 76 percent stated preoxygenation was mandatory, although the method for doing this was unclear in 69 percent. As for information related to ancillary testing, 66 percent of the guidelines specified when it was necessary. And although specific tests were often mentioned, such as EEGs (84 percent), the details of how the tests were to be administered were less common—only 33 percent mentioned EEG specifics.

Grave Differences

Although Greer and his team were encouraged by the rate of response from hospitals they contacted, they were disturbed by the variation they discovered. "We were surprised to find such significant differences among these hospitals in terms of their guidelines for brain death determination," says lead author Greer. "We anticipated more consistency with the AAN's practice parameters."

In pointing to the ethical as well as the medical-legal implications of such variability, the team underscored how wide-ranging guidelines can have unfortunate consequences, such as the administration of inappropriate treatment to patients who have been labeled brain dead. Noting that the AAN's practice parameters are more than a decade old, the researchers suggest a revision may be in order and that the results of their study could be used to inform such an effort. They also propose the development of web-based checklists or other new tools that could aid physicians who must make brain death determinations. ■

ABSENCE NOTED

A research consortium that includes Massachusetts General Hospital has found that the deletion or duplication of a section of chromosome 16 may be a strong risk factor for autism. The researchers scanned DNA from more than 1,400 affected children and a similar number of unaffected parents and found an identical region of chromosome 16 was missing in five individuals with an autism disorder. Data from a separate group of 1,000 patients from Children's Hospital Boston showed that among participants with a diagnosis of autism or a related developmental delay, five had the same deletion and four others had a duplication of the section. The work appeared in the February 14 issue of the *New England Journal of Medicine*.

WEED-BE-GONE

When oncologists talk of stems and seeds, chances are it's not a botanical discussion. Tumor stem cells, an immortal mutated cell type, are thought to be the seeds from which many, if not all, cancers develop. Impervious to all cancer-busting therapies, such cells are also rare, making their study difficult. Their elusiveness may now be threatened. A U.S.–China research team, with senior investigator Judy Leiberman '81, an HMS professor of pediatrics at Children's Hospital Boston, has produced large numbers of human breast cancer cells in mice—and has discovered a genetic switch that decreases their ability to propagate tumors. The switch, a type of molecule known as a microRNA, turned off certain genes that helped the cells spread tumors. The study appeared in the December 14 issue of *Cell*.

WHAT A PAIN

A class of drugs that is one of the more widely prescribed in developed countries may also be the source of its users' aches and pains. A team of researchers at Beth Israel Deaconess Medical Center has found that cholesterol-lowering statins act to increase levels of atrogen-1, a protein involved in muscle atrophy. This breakdown of the muscle tissue could, says senior researcher Vikas Sukhatme '79, the Victor J. Aresty Professor of Medicine at HMS, explain the range of symptoms, from mild muscle weakness to pain, reported by people using statins. The study appeared in December's *Journal of Clinical Investigation*.

NEW CAST MEMBERS

Researchers have unmasked some unknown genetic players in the regulation of the blood's levels of cholesterol and triglycerides. In the February issue of *Nature Genetics*, an international team, which included scientists from the Broad Institute of Harvard and MIT, reported associating levels of these fats with 18 genetic variants, six of which had never before been linked with this activity. Lead author Sekar Kathiresan, an HMS instructor in medicine at Massachusetts General Hospital and a genetics researcher at the Broad, notes the findings may offer a way to predict a person's risk for heart disease as well as open the door to the development of new treatments.

Did psychiatric illness help
or hinder the creativity
of some of history's most
celebrated composers?

by RICHARD KOGAN

MAGIC WAND: Leonard Bernstein's exuberance was legendary, and audiences worldwide responded as much to his performances as to his orchestral and choral compositions. "Life without music is unthinkable, music without life is academic," he once wrote. "That is why my contact with music is a total embrace."





**CHORDS OF
DISQUIET**

S

ERGEI RACHMANINOFF DEDICATED HIS *PIANO CONCERTO NO. 2* TO an unlikely muse: his psychiatrist. The Russian composer had suffered from a debilitating depression since the disastrous premiere of his *Symphony No. 1* three years earlier, and the illness had robbed him of his ability to compose music. After his psychiatrist cured his creative block through hypnosis, Rachmaninoff produced his second piano concerto, which became arguably his most celebrated work. The arc of the composition reflects his

emotional trajectory: the piece opens with mournful, elegiac chords and ends in triumph; Rachmaninoff marked the tempo of the piece's final section *risoluto*.

The relationship between Rachmaninoff's illness and his music intrigues me, for I'm a psychiatrist by day and a concert pianist by night. Ten years ago, the American Psychiatric Association asked me to give a presentation on the connection between creativity and mental

illness. Until that time, my careers had progressed on parallel tracks. But that experience helped me appreciate the synergy between the two domains. My psychiatric training enabled me to identify patterns of illness in the life stories of the great composers, and this understanding gave me insight into the creative process.

Posthumous diagnoses can be tricky, of course; it's difficult enough to diagnose correctly the living, breathing



WOLFGANG AMADEUS
MOZART
1756-1791

WOLFGANG AMADEUS MOZART composed symphonies so effortlessly that he seemed to be taking dictation from God. Lesser mortals would have suffered writer's cramp even *copying* that many notes.

Mozart is indisputably the greatest child prodigy in the history of classical music. His talents first became evident when he was three, and by the time he turned five he had already written short compositions for the clavier. Soon he had graduated to symphonies. He spent most of his childhood on tour, dazzling kings and queens at imperial courts throughout Europe with his precocious accomplishments.

While there have been other musical titans, Mozart's genius set its own exquisite bar. Ludwig van Beethoven would fill wastebaskets with rough drafts before producing a final masterpiece. Mozart, by contrast, was capable of mentally composing lengthy, complex string quartets while playing billiards.

Mozart's unique talent has inspired much speculation over the centuries, and scholars have posited various neuropsychiatric conditions to explain his behavior. The unending stream of profanities that laced his speech and correspondence has led some researchers, for example, to suggest that he had Tourette's; coprolalia, an obsessive use of obscene language, is an occasional feature of the syndrome. But there is scant evidence that Mozart

patients I see regularly in my office. But my exploration into composers' lives has taught me more about the very nature of music—and affirmed for me its healing powers.

For all its healing properties, artistic production, unfortunately, often reflects a darker side. The notion that mental illness disproportionately affects practitioners of art, literature, and music dates to ancient times. All great artists and philosophers, Aristotle believed, had to suffer from melancholy. Epidemiologic surveys have suggested, in fact, that the incidence of mental illness is somewhat elevated among artists.

It's important, though, not to romanticize the notion of mental illness as essential to creativity. Johann Sebastian Bach, Joseph Haydn, and Felix Mendelssohn are among the members of the classical music pantheon who seem to have escaped the burden of mental illness. And such maladies as depression are usually too paralyzing to be considered an asset to creativity.

Even so, an interplay often exists between illness and creativity. In Maurice Ravel's most famous work, *Boléro*, for example, the seemingly endless repetition of

a single musical phrase dominates. In creating this work, Ravel was clearly perseverating, an early symptom of the dementia that would eventually overtake him. He may even have sensed the imprint of his illness on his work; he once trivialized *Boléro* as a "piece for orchestra without music."

The link between mental illness and creativity requires a special sensitivity in treating mood disorders in artists. Psychotropic medications can lead to the blunting of emotional intensity. Some of the artists I treat have confided they would rather retain their creativity and suffer than sacrifice their expressive abilities. They raise a legitimate concern. Would Robert Schumann have been as productive a composer if he had taken mood stabilizers for his bipolar disorder?

Music and medicine are both healing arts, and music has often provided salvation to great composers. It was Pyotr Tchaikovsky, tormented by suicidal impulses for much of his life, who perhaps best summarized music's therapeutic properties. "Without music," he once declared, "I would go insane." ■

experienced the involuntary neuromuscular tics that would support such a diagnosis.

Others have glimpsed hints of Asperger's syndrome in his intense focus on music and his struggles with interpersonal relationships. Mozart was often socially inept, but anyone making a diagnosis based on his interpersonal deficits must acknowledge that his operas contain extraordinary insights into human nature.

Some scholars have speculated that Mozart suffered from a mood disorder, possibly cyclothymic or bipolar disorder. They have found evidence of mania in his amazing bursts of productivity; he composed his magnificent final three symphonies in six weeks. But he wrote more than 600 compositions in his short lifetime, and applying this standard would suggest he had been in a manic phase from the age of five until his early death thirty years later.

His mood shifts had little correlation with his creative output. He composed melancholic pieces in spirited moods and joyful music while despondent. During the last year of his life, when he was suffering enormously from depression, he produced *The Magic Flute*, which contains some of the most enchanting and rapturous music he ever wrote.

Regardless of whether Mozart would have satisfied any contemporary criteria for a psychiatric diagnosis, he clearly experienced psychological conflict. His father had

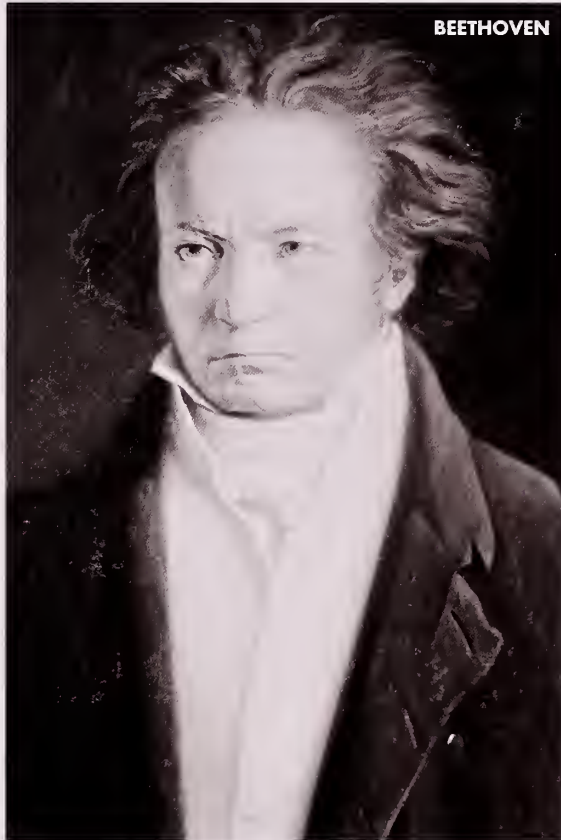
exerted tremendous control over him during his childhood and seemed reluctant to relinquish that control when Mozart grew to adulthood. The two waged epic battles. His father urged him to write popular, more remunerative music, for example, while Mozart desperately wanted to establish his own artistic voice. Mozart was torn between the desire to please the father who had nurtured his talent and the desire to assert his independence.

The former prodigy, accustomed to receiving fawning attention from royalty, did have trouble growing up. As a youngster, he digested obscure textbooks on counterpoint, wrote sophisticated operas, and had to forgo much of the unstructured play that most children are permitted. As an adult, he was often childish, impetuous, and tactless. He frittered away his family's money and missed deadlines on his commissions, behaviors that only worsened after his father's death. But Mozart did make the transition from wunderkind to mature master, and the compositions he wrote as an adult have far more subtlety, depth, and passion than anything he wrote as a child.

The mystery of artistic genius is a fascinating one for those of us who seek to understand the human mind. The scorching speed at which Mozart lived—and composed—will continue to fuel speculation on his behavior and the source of his creative intensity. ■

SCHUMANN WOULD be besieged by delusional thoughts.

He would have auditory hallucinations as well, cacophonous sounds he could not dislodge from his brain.



LUDWIG VAN
BEETHOVEN
1770–1827

THE TALE IS OFTEN TOLD that Ludwig van Beethoven, upon becoming completely deaf, sawed the legs off his piano so he could feel its vibrations through the floorboards as he composed. We can easily imagine him sitting at that keyboard: unruly hair, wild eyes, fingers pounding the keys so forcefully that the strings broke.

Beethoven has long evoked the image of a tortured, mad genius. He had an intense, tempestuous personality, and he could slip from rage to raucous laughter to serenity within minutes. His hearing loss, which began while he was in his late twenties, became the central torment of his life. Deafness can be a hardship for anyone; for a musician, it's a catastrophe.

When Beethoven lost his hearing, he contemplated suicide. But then he decided to seek salvation in the music he could no longer hear. With his career as a virtuoso pianist now ended, he dedicated himself anew to composing.

Once Beethoven locked himself into the silent world of his imagination, his musical genius blossomed. Unable to hear the music of his contemporaries, he conjured a world of sound different from anything previously conceived. Much of his music reflected struggle and the attempt to achieve transcendence over that struggle. And his music, with its sudden shifts and enormous unpredictability, mirrored his emotional volatility. Beethoven was capable of translating melancholy and ecstasy into musical terms with unmatched virtuosity.

One result of this inner unleashing was the *Ninth Symphony*, one of his most celebrated works. Poignantly, during the Vienna premiere of the work, Beethoven, in his first onstage performance in a dozen years, hovered alongside the conductor, offering tempos to an orchestra that for him was silent. Following the symphony's conclusion, the contralto gently turned Beethoven around so he could witness the audience's thunderous applause.

In 1812, the collapse of a romance with a woman known as the Immortal Beloved convinced Beethoven he would never experience marriage or a conventional family life. The emotional fallout led to an extended period in which his productivity dropped precipitously. After his brother's death, he directed his energy toward the aggressive pursuit of sole custody of his nine-year-old nephew. He became overtly psychotic during this custody battle, accusing the boy's mother of poisoning her husband and insisting against all evidence that he was the actual biological father of the child.

After bitter and protracted legal wrangling, Beethoven was eventually awarded guardianship of the child. The creative floodgates opened after his victory, and the glorious final phase of his career commenced. The rages he had expressed as a younger man softened, and his music became more spiritual and ethereal than anything he had previously composed.

Centuries later, the composer still provides one of the greatest examples of the sublimation of suffering into the creation of masterpieces. His moods, he once wrote, "...sound, and roar and storm about me until I have set them down in notes." Fittingly, Beethoven died amid the thunderclaps of a savage spring storm. ■

ROBERT SCHUMANN

1810–1856

THE YEAR HE MARRIED Clara Wieck, Robert Schumann wrote nearly 150 love songs. His staggering productivity was a sign of his infatuation with the brilliant young pianist, but it also signaled his entry into the manic phase of his bipolar disorder.

No composer illustrates the link between mental illness and creativity better than Schumann. Analyses of historical figures are speculative by nature, but his carefully kept diaries provide detailed information about his mental state for nearly every day of his adult life.

In those diaries, Schumann wrote that he believed that the sole purpose for composing music was to express the composer's state of mind. While his contemporaries were writing music following established forms like the sonata, Schumann was revealing glimpses into his psychological world through pieces with such titles as *Rapture* and *Feverish Dreams*. And that world was filled with racing thoughts and flights of ideas.

Schumann composed prolifically during his manic periods. In one two-week burst of inspiration, he completed three string quartets, barely pausing for sleep. Such creative frenzies were inevitably followed by months of torpor, both literal and musical. During his depressive periods, Schumann was unable to concentrate. He would be besieged by delusional thoughts, convinced he was worthless as a composer. He would have auditory hallucinations as well, cacophonous sounds he could not dislodge from his brain.

Although Schumann felt hounded by these intrusive sounds, illness brought him undeniable creative advantages. The hypomanic state of his bipolar disorder brought him increased energy, a decreased need for sleep, and a sharpened imagination. His racing thoughts were frequently accompanied by a heightened mental flexibility, resulting in innovative ideas and imaginative solutions to creative problems.

As Schumann grew older and more psychologically disorganized, he turned to music as a source of healing. Despite his mistrust of musical form, he began engaging in the writing of fugues and counterpoint, compositional techniques that rely on intricate sets of rules. He discovered that when his thinking was especially chaotic, composing under the constraints of meticulous guidelines helped organize his thoughts and sometimes lifted his spirits.

Yet even music ultimately failed to calm his fevered thinking. At age 43, Schumann jumped off a bridge into the Rhine River, but nearby fishermen thwarted his suicide attempt. He was taken to a mental asylum, where he spent the final two and a half years of his life.

His deterioration in the hospital was dramatic. It has been suggested that neurosyphilis may have exacerbated his psychiatric disorder, and he was subjected to a range of ineffective treatments, such as phlebotomy. A piano was available in the hospital, yet he never used it; one of the most poignant features of his terminal illness was his loss of interest in music.

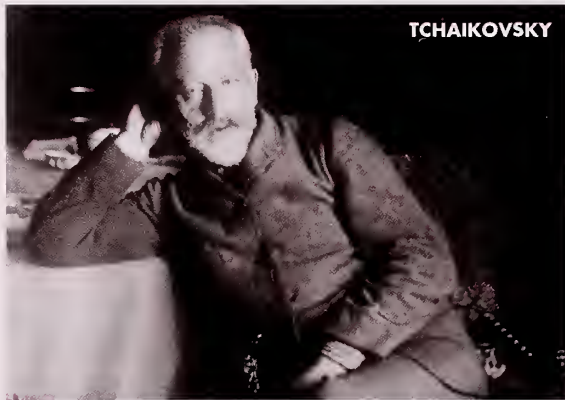
One can only imagine how many more masterpieces he could have offered the world. Schumann once lamented that he had a hundred symphonies racing through his mind simultaneously. "Sometimes," he wrote, "I am so full of music, and so overflowing with melody, that I find it simply impossible to write down anything." ■



CLARA AND ROBERT SCHUMANN

THE TREMENDOUS ENERGY Gershwin had poured into delinquent behavior became redirected. “Studying piano,” he said, “made a good boy out of a bad one.”

PYOTR
TCHAIKOVSKY
1840–1893



WHEN CONDUCTING an orchestra, Pyotr Tchaikovsky would use his right hand to flourish his baton—and his left hand to keep his head fastened to his neck. He was convinced, he said, that when he mounted the podium his head would detach and fly off. This delusion reflects the psychological torment that plagued the Russian composer during his troubled life.

Tchaikovsky was chronically depressed, and he filled his diaries with suicidal musings. “I have a boundless feeling of loneliness, despair,” he once wrote. “I’m experiencing an insane sorrow . . . Death is really the only blessing.”

The composer tried to numb his emotions with alcohol. “A man tormented by feelings such as mine simply cannot live without alcohol poison,” he confessed to his diary. “I’m drunk every evening, and I cannot live otherwise.”

But the only truly effective therapy for his despondency, he found, was composing music. And it was during his most intense personal crises that he wrote some of his greatest music. This pattern of crisis and composition was set early: His mother died of cholera when he was just fourteen, and he wrote his first musical composition within several weeks of her death.

Through his music Tchaikovsky sought to escape his anxiety and despondency by concocting fantasy worlds. His classical ballet masterpieces—*Swan Lake*, *Sleeping Beauty*, *The Nutcracker*—featured whimsical places of beauty and grace in which he could find solace.

Yet his escapes were fleeting. Fear of being exposed as a homosexual dominated Tchaikovsky’s life. This wasn’t an irrational phobia; in czarist Russia, homosexual acts were punishable by loss of civil rights and banishment to

Siberia. He spent his entire adulthood obsessed with hiding what he termed his moral ailment, going so far as to marry a woman to try to escape social scrutiny. The disastrous union ended after just six weeks.

When Tchaikovsky died at the peak of his powers at the age of 53, the official verdict was that he had succumbed to cholera after drinking tainted water. There is credible evidence, however, that he had become involved with a teenaged boy and had committed suicide to avoid the public humiliation of a sexual scandal.

Tchaikovsky’s final symphony, *Pathétique*, which premiered just days before he died, contains one of the most haunting evocations of death in all of music. As tragic as his torment was, it likely enhanced his music. We can hear in his compositions intense suffering, melodic inspiration, and the transformation of great anguish into great art. ■

GEORGE
GERSHWIN
1898–1937

AS A BOY growing up on the Lower East Side of New York City, George Gershwin misbehaved. He set fires. He stole from pushcarts. He started fistfights. He played hooky. When he managed to attend class, he could barely sit still. Had he been a child today, he might have been sent to a psychiatrist, diagnosed with conduct disorder or attention deficit hyperactivity disorder, and sent home with a prescription for Ritalin.

But Gershwin discovered his own medication at the age of ten, when he overheard a classmate’s violin recital through an open window. From the moment the boy played the first notes of Antonin Dvorák’s *Humoresque*, Gershwin was so entranced he decided



LEONARD BERNSTEIN

1918–1990

"I'M THE ONLY PERSON I know," Leonard Bernstein once declared, "who is paid to have a fit in public." And his performances as conductor validated his statement: He would flail his arms, wag his brow, and shake his great mop of hair. Audiences loved him. And he loved audiences.

Bernstein's versatility was breathtaking. He excelled as a composer, pianist, and music educator. He relished the collaborative nature of musical theater, with the score for *West Side Story* his best-known contribution to Broadway. He was most in his element, though, when conducting a hundred musicians before an

ta dedicate his life to music. The tremendous energy he had poured into delinquent behavior became redirected. "Studying piano," he said, "made a good boy out of a bad one."

Gershwin's hyperactivity became a hallmark of his musical persona; it is hard to imagine that those incessant, rapid-fire notes in *Rhapsody in Blue* could have been composed by anyone who wasn't hyperactive. And as a pianist, his style was fast and clipped. When asked why he played even slow songs that way, he responded, "We are living in an age of staccato, not legato."

Sadly, in his mid-thirties, at the peak of his career, Gershwin lost a great deal of his vitality when he fell into a depression. Neurological symptoms, such as the perception of a phantom smell of burnt rubber, soon joined psychiatric ones. What he didn't know—and what his doctors wouldn't discover until the day before his death at an operating table—was that his brain had been in the grip of a fatal tumor.

Part of what I find compelling about Gershwin's decline is that his depressive symptoms coincided with his creation of *Porgy and Bess*, an opera that explores sadder and painful themes. Gershwin, until then largely known for a repertoire of buoyant love songs, suddenly produced songs of lament and even anguish. As his illness began to temper his staccato nature, he produced a work of extraordinary depth and profundity. ■

audience of thousands of people. He was probably the most sought-after conductor in the world during his lifetime.

Yet his gifts were shadowed by an internal struggle. Bernstein longed to write symphonic masterpieces, and he believed he had the talent to do so. But he had a hyperthymic temperament: energetic, exuberant, and indefatigably sociable. He was therefore far better suited to performing than to the largely solitary task of composing. Whenever he sat down to write a classical piece, he felt overwhelmed by the loneliness of the process. While he did produce some wonderful symphonic works, he died believing he had fallen short of all that he wished to achieve.

Some people have suggested that hyperthymic individuals—with their high energy and elevated baseline mood—are the fortunate few who are hard-wired for happiness. But some hyperthymics can experience a precipitous drop in mood when they feel stymied. In the last decade of his life, Bernstein suffered episodes of severe depression, with each feeding an endless cycle of hobbled creativity and renewed despondency.

During those later years, Bernstein found it demoralizing to be celebrated more as a conductor than as a classical composer, for he believed only classical composers could achieve immortality. Ironically, nearly two decades after Bernstein's death, professional performances of his popular compositions occur almost daily around the world. Each month, dozens of theaters worldwide stage *West Side Story*, which premiered more than five decades ago. And the audiences Bernstein found so necessary still love his work. ■

Richard Kogan '81, a Juilliard-trained concert pianist and a Harvard-trained psychiatrist, also co-directs the Human Sexuality Program at Weill Cornell Medical Center. For more information about the performance-lectures he gives on the internal struggles of composers, visit <http://alumnibulletin.med.harvard.edu>.



BERNSTEIN



Harold A. Swartz
Cardiologist

Vizzo Pavilion
Physician Offices

Rampant violence in his barrio leads a boy to risk his life to immigrate to the United States—and inspires him to become a healer. *by* HAROLD FERNÁNDEZ

this side of
Paradise

MY BROTHER AND I WERE TOLD TO STROLL TWO BLOCKS south, enter through the main marina gate, and proceed to the dock, where a boat would be waiting for us. The instructions were simple enough. But that walk was the scariest of my life. • No stars illuminated the sky over the tropical island of Bimini as we stumbled along in the dark; our only light came from two small lamps at the marina entrance. There we were startled to see a tall man in a cowboy hat pointing to the dock. I felt a surge of panic. He wasn't part of the plan. Had something gone wrong?

PHOTO: JONATHAN SAUNDERS



MODEL CITIZEN: After graduation from Harvard Medical School, Harold Fernández undertook surgical training at the New York University Medical Center and Bellevue Hospital. He is now a cardiothoracic surgeon at St. Francis Hospital in Roslyn, New York.

I could feel myself trembling as we continued to the end of the dock, where another man helped us onto a boat and guided us to its pitch-dark cabin. We couldn't make out the faces of the people already huddled there, and no one spoke. The only sounds we could hear were the murmurs of the two men on deck, the lapping of water, and our own labored breathing. Soon the boat's engine came to life, and we began to move.

It was midnight on October 26, 1978, when my brother and I were smuggled, along with ten other illegal immigrants, onto a small pleasure boat to cross the treacherous waters of the Bermuda Triangle. Byron was eleven; I was thirteen.

Tempting Fate

Danger was not new to me; it had long been woven into the daily fabric of life in my hometown. I grew up in Barrio Antioquia, a poor neighborhood of Medellín, Colombia, with a long and rocky history. In the early 1950s, the mayor had designated Barrio Antioquia the city's "zone of tolerance," to allow legalized prostitution. Within days, hundreds of houses were converted

into brothels, with red lights casting an odd glow over their entrances.

Although the designation lasted only a few years, it tore at the social and moral fabric of the barrio and left it vulnerable to exploitation. Decades later, when the city became home to the Medellín Cartel, one of the world's most powerful drug-trafficking organizations, Barrio Antioquia served as a key supplier of young talent: the leaders; the *sicarios*, or hired assassins; and the *mulas*, or drug couriers. To retain their power and gain prestige, many cartel members formed gangs; Barrio Antioquia alone had eight.

Under the leadership of the notorious Pablo Escobar, known as *El Patrón*, or The Boss, the cartel grew to be almost as powerful as the official government of the country. Escobar was popular with the poor because he made considerable donations to charitable organizations, established welfare programs, and built housing complexes, soccer stadiums, and churches. At the same time, the city remained hostage to his reign of brutality.

Medellín and its people suffered deep wounds from the cartel's horrific acts of violence. During the worst

Several people witnessed the fight, but no one ventured close to help the dying teen. An hour elapsed before an ambulance arrived to pick up his body.

years, the city had a homicide rate more than five times those of the most violent cities in the United States.

Despite this, the cartel held an allure for young people living in the despair of a poverty so deep that even toilet paper was considered a luxury. In contrast, the cocaine industry promised enormous wealth and power almost overnight. I remember spending hours with my friends gazing covetously at the flashy cars and motorcycles the drug traffickers parked outside neighborhood bars. The temptation proved too great for some of my friends; without exception, those who joined the drug trade ended up either imprisoned or gunned down.

Playing in Traffic

As a boy, I spent most of my free time playing soccer in the streets of Barrio Antioquia. Many of my friends played in bare feet because they couldn't afford shoes; on weekdays they eagerly waited for me to finish my homework, as I was the only one who owned a ball.

Although this material poverty was difficult, it was the spiritual poverty—the loss of childhood innocence—imposed by the drug trade that was far harder to bear. It even invaded our childhood sports. One hot summer day I was sitting by the side of my house, watching a soccer game, when an older player, Alvaro, started arguing with Marlon, a player from the opposing team. They began pushing each other, and Alvaro knocked Marlon to the ground. Marlon jumped up, rammed Alvaro with his head, and ran off. The game continued.

A half hour later, I suddenly heard a gunshot. I could see Alvaro, just ten feet from where I sat, clutching his side, trying to stanch the blood now soaking his shirt. Then I noticed Marlon sauntering off, a gun dangling from his hand. He neither ran nor made any attempt to hide his weapon.

Alvaro was bundled into a car and rushed to the emergency room. He was fortunate; the bullet had missed his major organs, and he was released from the hospital a week later. No one pressed charges because no one had the courage to testify against Marlon. He was not only a member of a powerful gang, but also a *sicario* for the cartel. Just fifteen years old, he had already killed several people in the barrio.

A few months later, from behind the curtains of a window, I witnessed Marlon's death. He had been staggering down the street, drunk and high on drugs, when he ran into a member of a rival gang. The argument that ensued quickly escalated into a scuffle. Marlon didn't have a gun this time; instead, he pulled out a machete. His opponent had no weapon, but he was older, taller, and neither drunk nor high. He picked up a rock and pounded Marlon's head until he knocked him to the ground. There he savagely punched and kicked him. Within minutes, Marlon lay motionless in a pool of blood.

Several people witnessed the fight, but no one ventured close to help the dying teen. An hour elapsed before an ambulance arrived to pick up his body. Again, no one was charged, and the crime was never officially solved.

Islands in the Stream

For every Colombian who became involved in drug trafficking in those years, thousands more fled to fields and factories in the United States, seeking peace, security, freedom, and economic opportunity. My parents, who were already living in New Jersey as undocumented workers, were growing increasingly desperate to remove my brother and me from the barrio. They made arrangements, and we received elaborate instructions.

Our adventure started with what was supposed to look like a routine departure from the Medellín airport. We needed to keep a low profile; only a few people could accompany us to the airport, and we had to behave as though we were leaving for just a vacation, not a lifetime. Yet my entire extended family showed up, along with many friends. My grandmothers and aunts were sobbing, and I was terrified about what the officials watching us might be thinking.

As Byron and I crossed the tarmac toward our plane, I glimpsed the terrace where I had stood to wave goodbye to my father four years earlier and to my mother two years after that. Now I was on the other side, waving to a crowd of well-wishers. At best I would not see my beloved grandmothers for a long time; at worst I would never see them again.

The group we were traveling with stopped in Panama briefly before boarding a plane to the Bahamas. During

The worst-case scenario was no longer g

the layover, customs officials detained one member of our group; we never saw him again.

According to the plan, we would stay in Bimini for less than a day. After arriving at our hotel, more than a dozen of us met to finalize our plans. Our boat trip would take place at night to reduce our odds of being caught by the U.S. Coast Guard. We were now only 50 miles from Florida, and the voyage would last five to six hours. I was excited; one day more, and I would see my parents.

The leader of the group collected our fees—about \$600 apiece—and instructed us to wait while he met with our local contact. When the leader returned, though, he brought bad news. The sea was too rough. Even more worrisome was that our contact didn't know when we could leave. Hurricane season was in full force. Our departure would depend on the weather.

For the next twelve nights, after our lights—and that day's hopes—were extinguished, we would hear tapping on our door and unfamiliar voices offering us boat rides to Florida. We had been instructed to answer that we were merely on vacation and had no interest in crossing to the United States. As the days passed, and the members of our group grew more anxious, several accepted those offers. We never learned whether they made it safely to Florida.

Those of us remaining had been warned that Bimini was swarming with undercover immigration officers looking for people who were trying to cross to the United States. To avoid drawing attention to ourselves, we pretended to be tourists. But by the end of the first week, our tourist visas had expired. We holed up indoors; if caught, we could be deported.

Finally the weather broke. That night we would risk death for a chance to live in the United States.

The Young Man and the Sea

As we huddled in the dark cabin of the boat, the reality of our situation hit me hard. I dreaded crossing the Bermuda Triangle, infamous for the mysterious disappearances of so many planes and ships. Byron and I couldn't swim and had no life vests. The worst-case scenario was no longer getting caught by the U.S. Coast Guard and being sent back to Colombia; it was dying at sea.

The movement of the boat soon became unbearable. We felt the constant cycle of a steep climb, a sudden descent, and a bang so loud it made us shriek in terror. At the end of each cycle it felt as though the boat would split in half. We all began praying aloud.

We also began throwing up. After a while, we didn't even try to maintain decorum. We vomited everywhere.

Most of us sat with our heads down, praying, retching, and clinging to someone or something to avoid being thrown across the floor. On deck, the captain was fighting to maintain control of the vessel, while the sole crew member used a bucket to try to bail out the water sloshing into the boat.

Hours passed. Finally, on the other side of the cabin's small door, darkness began to give way to light. With the dawn, the waves grew milder. The rocking motion of the boat eased and the thump of the boat against the waves softened. We all began to feel safer.

After hours of throwing up we were so dehydrated we could barely rise from a sitting position. Yet as we approached the Florida coast, the boat slowed, and I managed to stand up and peer through a cabin window. In the distance I could see other boats and a shoreline with buildings. I realized we were in U.S. waters.

For an hour the captain searched for a safe place to dock. Meanwhile, those of us in the cabin cleaned ourselves up as best we could and climbed up on deck. It was a beautiful, sunny day. The boat stopped at what appeared to be an abandoned dock. As we stepped off the boat, the captain handed us cards showing our location. It felt wonderful to stand on land again.

My brother and I found a public telephone several hundred yards away and called my parents' friends to let them know we had arrived. They put us up for the night, and the next day they drove us to the Miami airport, where we boarded a flight to Newark.

The Dreaming Spires

Our first summer in New Jersey proved pivotal. Byron and I had behaved during the school year, enduring the taunts of classmates, who often called us refugees, and struggling to learn English, a language we had barely even heard before. But now with the summer months we savored our freedom. From the streets of Medellín we had brought not only advanced soccer skills but some bad habits as well. We smoked; we drank; we threw empty bottles at storefronts.

My parents despaired that they had waited too long to bring us to the United States. Yet they also understood that this was a critical time in our development. So whenever we visited my father at work, he would take time to show us his working conditions. He spent twelve to fourteen hours a day in a dank, dark building with no air conditioning and the deafening sound of embroidery machines. He cautioned us that if we didn't take advantage of the opportunities this country offered, we would end up working under similarly bleak conditions.

getting caught by the U.S. Coast Guard; it was dying at sea.



FAMILY CIRCLE: Clockwise from far left: the author as a student in Medellín; as a baby with his parents in Cali, Colombia; and as a five-year-old standing with his brother Byron. Upon reuniting with their parents after a harrowing sea crossing to the United States in 1978, Harold and Byron met a U.S.-born brother, Marlon, then sixteen months old, for the first time. A fourth son, Alex, was born in New Jersey three years later.

These conversations with my father proved effective. In the eighth grade I buckled down and became a model student. My success through high school grew so much that I soon had my sights on Princeton, a university I had come to admire while competing in track meets on its campus.

But as the time to apply to college drew near, I needed a green card and a Social Security number. I wasn't eligible for legal residency, so I bought a green card on the black market. With that document, I could apply for a Social Security card. But when I went to a local office of the U.S. Immigration and Naturalization Service, the clerk, after taking my documents, excused herself to make a phone call. I panicked. I grabbed my papers, fled the building, and ended up purchasing a fake Social Security card instead.

My family had long lived in a shadow society, ever fearful of discovery, ever conscious of dodging immigration authorities. After I enrolled at Princeton, I felt like an imposter as I gazed at the imposing gothic architecture

that F. Scott Fitzgerald had so eloquently described in his debut novel, *This Side of Paradise*: "... topping all," he wrote, "climbing with clear blue aspiration [were] the great dreaming spires of Holder and Cleveland towers."

Like Fitzgerald's protagonist, I loved Princeton from the beginning. But as I walked through campus I doubted my right to be there. For starters, I was an illegal alien; I had used a phony green card and Social Security number in my application. I also harbored serious doubts about my scholastic achievements, and I suspected my SAT scores were the lowest of anyone in my class. My accent mortified me. Whenever I spoke, I thought the other students must be wondering how anyone with such a heavy accent could possibly have been accepted.

One evening, at the beginning of my second semester at Princeton, I received a letter from the dean of my college. She wrote that my first-semester grades had placed me at the top of my class. She congratulated me and encouraged me to keep up the good work. With that

In the violence that ensued, hundreds of people across the city—including police officers, judges, and politicians—were murdered.

letter, I began to relax. Perhaps I had earned the right to be part of this historic institution after all.

The Legal Limit

Just weeks later, that sense of belonging vanished when I found a second letter waiting in my student box, this time from the dean for foreign students. As I opened it, I assumed it would be an invitation to a social event. But instead I discovered an official missive asking me to bring in my original legal residency documents so they could be photocopied and included in my file.

Suddenly I felt sick. Years before, during my ocean crossing, the fear of discovery had compounded my feeling of seasickness. Now the fear of discovery rose again, along with my nausea. I realized how vulnerable I was; the wonderful dream that had begun at an abandoned boat dock on the Florida coast was about to end.

After agonizing for several days, I realized I had two choices. I could present the dean for foreign students with my forged documents. But I decided this wouldn't work; I didn't have the stomach to continue my charade. My second option was to meet with her and admit I didn't have any legal documents. First, though, I decided to share my problem with someone I trusted.

So one afternoon, after class, I asked my Spanish literature professor, Arcadio Díaz-Quinones, for a few minutes of his time. He replied that I could have as much time as I wanted. He closed the door and sat down with me at a table. I tried to speak, but instead, under his sympathetic gaze, I burst into tears. He put his hand on my shoulder as I wept with my head on the table. After several minutes, I lifted my head and managed to talk. I detailed for Díaz all I had done to enter this country and conceal my residency status. I told him about my fear of being expelled or even deported.

Díaz listened patiently to my story. When I finished, he advised me not to tell anyone else. Over the next few weeks, he met with several administrators. At first, he discussed the problem with them in theoretical terms, without mentioning my name. He then set up a meeting with university officials. They decided that I should meet with the dean of my college, the same woman who had sent me the encouraging letter at the start of my second semester.

Nancy Weiss was just as friendly in person as she had seemed in her letter. She told me that Princeton was proud to have me in its student body. But the university had two problems with my case. First, I had broken its honor code. Second, I had been receiving U.S. government grants. Since I wasn't a legal resident, this was against the rules.

But then Weiss went on to tell me that both problems had solutions. For the first one, I needed to write a detailed essay explaining my understanding of the honor code, how I had broken it, and why I was seeking a pardon from the university. To resolve the second problem, the university would change my status from that of a local student to that of a foreign student. With this change, Princeton could provide all my grants and scholarships with university funds.

I left the office feeling great relief: I could square with Princeton. But this was far from the end of my troubles. Now that my undocumented status—and that of some family members—had been revealed, we had to move quickly. While the university was willing to let me stay, immigration authorities could opt to send my family members and me back to Colombia.

Princeton arranged for us to meet with one of New York's top immigration lawyers, who confirmed what we already knew: My family didn't qualify for any of the categories under which people already in the country could be granted legal residency. We needed a miracle.

As it turned out, our first meeting with an immigration judge was a success. We weren't granted legal residency, but we weren't deported, either. Instead, we were entered into a category known as suspension of deportation proceedings, meaning that although we didn't qualify for any of the immigration provisions, the judge was sympathetic. He realized that my family was humble, honest, and hard working.

Our case seemed as if it would drag on forever, and over the next several months I spent many hours reading my organic chemistry textbook while standing in line at the regional immigration office in Newark. But in August 1986 the judge announced that he was ready to decide our fate. We dressed in our best clothes and filed into the back of the courtroom, waiting for our case to be called. When the judge delivered his verdict, my parents, who understood only Spanish, didn't immediately grasp his meaning: He had granted us legal residency.



You Can't Go Home Again

As a boy living with my grandmothers in Colombia, I often witnessed our doctor making house calls. The doctor would come to our house, examine my grandmothers, and provide healing advice over a cup of coffee. I also noticed that physicians, who could support their families without resorting to unlawful activities, were revered in the barrio. I wasn't the only one paying attention; from the time I was young, my grandmothers had decided I should be a physician. They even scrimped to buy me a toy doctor's kit.

By the time I applied to medical school, I had confidence in my ability to achieve my professional dream. I was a legal resident and had done well at Princeton. When I received a letter of acceptance to the Harvard-Massachusetts Institute of Technology program in Health Sciences and Technology, I happily accepted.

It was during my time at Harvard Medical School that I returned to Medellín for a research project. In the summer of 1992, with an education grant from Brigham and Women's Hospital, I undertook an evaluation of the city's emergency medical care system. My goal was to observe how critically injured patients were treated in the trauma center of the city's main public hospital, San Vicente de Paul. I analyzed ambulance response times, transportation modes to the hospital, and the care provided.

One of my findings was that trauma victims tended not to be transported by ambulance. The injured, especially the victims of gunshot and knife wounds, were usually taken to the hospital by friends or family members in private cars. This finding didn't surprise me; I had only to recall what happened when Alvaro had been shot on that summer's day so long ago.

During the six weeks of my study, I stayed at an aunt's house in Barrio Antioquia. This was the time when violence in Medellín—and my old barrio in particular—had reached its peak. Pablo Escobar had recently turned himself in to the Colombian government to avoid being extradited to the United States. In exchange, he was allowed to build his own luxurious jail, *La Catedral*, on a mountaintop overlooking Medellín. His confinement was widely regarded as a joke—and an embarrassment to the government. He was rumored to be overseeing the cartel from his prison and to be coming and going as he pleased.

But Escobar's hold on the city was no joke. One evening, I was sitting on the balcony of my aunt's house when the calm was shattered by the sound of gunshots. As I peered over the edge of the balcony, I witnessed the cold-blooded killing of a young man just a hundred yards away. The killer coolly walked away with the gun in his

hand. The victim's family rushed him to San Vicente de Paul, where he was declared dead on arrival. Before my eyes he had become one of the more than 150 homicide victims in my old barrio that year.

A week before my return to Boston, Escobar escaped from custody, and his organization started a ruthless campaign of terror against the government and the innocent people of Medellín. In the violence that ensued, hundreds of people across the city—including police officers, judges, and politicians—were murdered.

On my return flight, I thought about how dramatically my life had changed since that night in the dark cabin of a sea-tossed boat. If I had stayed, I wondered, would I have become one of the doctors working in the emergency department at San Vicente de Paul, or would I have been recruited into a short life of drug trafficking and violence? Would I have fallen victim to an unsolved murder, just as seven members of my extended family had?

Now, in my work as a surgeon, I often remember the senseless slaughter of all those young men and women. The helplessness and fear I felt when witnessing violence have since given way to the confidence and knowledge that my education and experiences as a healer have instilled. My grandmothers were right; I have found much satisfaction in a life that helps relieve suffering. ■

Harold Fernández '93 is a cardiothoracic surgeon at St. Francis Hospital in Roslyn, New York.

Medicine needs to steer a course that balances inspiration and science to achieve a health care system that works for all.

Small Craft Advisory

NINE YEARS AGO the television program *Nightline* spent a week at Harvard Medical School filming our approach to patient care. The reporter took ample time with our students and faculty, and the program developed a wonderful picture of our high standards of care and our emphasis on the doctor-patient relationship.

At the end of that week, the reporter and I were walking together when he suddenly asked, "What happens if you train your students the way you've shown me

by DANIEL D. FEDERMAN



PHOTO BILL TRUSLOW/STONE/GETTY IMAGES

As many as 50 million are uninsured, half that number again are underinsured, and many members of the middle class are just a serious illness away from bankruptcy.

and they then enter a world that won't let them practice as they were taught?" Without a moment's hesitation, I answered, "Then they ought to change the world."

A medical student's life should be intellectually dazzling, emotionally rewarding, and morally transcendent. It should be intellectually dazzling because the progress in biomedical science—from genomics to imaging to molecular diagnosis to therapy—gives the process of becoming a doctor incandescence. It should be emotionally gratifying because the opportunities for helping individual patients and populations of patients achieve better lives have never more closely aligned with entering students' aspirations. And it should be morally transcendent because from the first day of medical school one should feel enlisted in the never-ending challenge of achieving better health for all.

Yet several imbalances persist in medical education today, while our health care system as a whole is sailing off course. Among these educational imbalances is the one between inspiration and science. At first glance this notion may seem both philistine and counterintuitive. I don't mean medical schools have too much science; their faculty members in basic science represent a major fraction of the country's biomedical scientists. These teachers delight in sharing their research passions with medical students. And since the introduction of evidence-based thinking in clinical departments, that domain of medical education has become rich in science.

My point, rather, is that medical education offers too little inspiration. Medical students don't spend enough time with the senior faculty who are eager to nurture their talents. They don't witness the continuity of patient care that is the essence of internal medicine. They don't see surgical patients before the patients are draped—that magical moment in which one human gives another human permission to cut into his body. And they spend too much time with junior faculty and with residents who are often too tired, irritable, and troubled to inspire young people.

Even Keel

It's a long way from the bench to the examining table. Most of the scientists in our basic science departments hold doctorates but have no training and often little interest in medicine. And in recent years, faculty members have been rewarded for basic science

research through appointments, promotions, honors, and opportunities for supplemental income. Important advances in basic science are now crying out for clinical investigation and translational research, and we're desperately short of people entering those disciplines. We must rebalance the value structure of our schools to invite bright young students into translational research.

In addition, we need teacher-clinicians who remain close to the emerging science of their areas—even though they are not doing the research—and can convey the meaning of this progress to medical students and patients alike. These individuals are critical members of medical school faculties and should be developed and rewarded as such. Outstanding examples of the role of teacher-clinician have been grossly underrepresented in the past, and that balance should be restored.

A close corollary of this imbalance is an inadequate respect for clinical excellence. Most medical students will practice medicine, and their learning environment and experience should include a veneration of outstanding doctoring with all it entails.

There is no such thing as too much attention to the individual when one is caring for the sick. All one's intellect and empathy must conjoin in the service of diagnosis, management, and care. But in the overall distribution of a medical student's time, we pay too much attention to what is immediately wrong and give too little thought to preventive measures addressing what is likely wrong or what is going to be. The closer you hover to death, the better a fourth-year medical student or intern can serve you. Yet most people are not at any given time fatally ill, and the almost onanistic absorption with the clinicopathological conference, our most revered teaching function, should be replaced with a broader interest in likelihoods, prevention, and amelioration. This emphasis should be enriched with insights from social science, including a focus on the patient's family and the public as a whole.

By a wide margin, though, the most serious imbalance in the education of our students is the faculty's focus on the intense care of the sick while the setting in which that care occurs—the U.S. health care system—is in serious disarray and getting worse. As many as 50 million are uninsured, half that number again are underinsured, and many members of the middle class are just a serious illness away from bankruptcy. In addition, gross disparities of care and health indices persist along racial, ethnic, and socioeconomic lines. We fail to apply the





power of preventive measures well enough to make a difference, and our health outcomes are barely competitive with those in developing countries.

Where is the disquiet that African American newborns have more than twice the mortality of whites? Where is the outrage that more than half our citizens cannot access or afford routine primary care? Where is the shame that among 19 industrialized nations we are ranked dead last in health care measures? Where is the horror these findings should evoke? And where is the agreement, or at least the debate, that health care is a fundamental right, one no more alienable than those protected in the U.S. Constitution?

Sailing Close to the Wind

To help answer such questions, perhaps we should start by analyzing the clinical exam. Imagine for a moment watching a doctor-patient encounter as though you were utterly naive of it. First, two strangers meet in a closed room, unobserved. One is fully dressed, the other at least partially undressed. Within a minute or two—especially these days—one of them starts asking questions not only about medical symptoms, but also about intensely private matters, such as sexual preference, the number of sexual partners, and the consumption of any illicit drugs. And the other person answers if not with aplomb then certainly with the view that the questions—which would have absolutely no standing in any other setting—are appropriate in that room.

Next, the questioner moves on to a physical examination that combines intrusiveness and physical access completely without parallel in social interaction. Without consent, the process of the physical examination would indeed fit an expanded definition of rape.

Third, the person in the flimsy hospital gown agrees to take medications the fully dressed individual suggests—up to and including general anesthesia. In other words, there is a total submission, admittedly with informed consent, to an undoing of consciousness and self.

And finally, the questioner receives permission to operate on the other person—to remove an organ, to perform a transplant, to alter the body in any way he or she deems fit. This final act, which takes place every day in our operating rooms, would be a felony in any other setting.

PHOTO: SCOTT MCDEEMOTT/GAMMASTOCK PHOTOGRAPHY/NEA

Is it ethical to have patients wandering in the doughnut hole of Medicare Part D and needing to decide whether to pay for food or a new prescription?

What justifies this extraordinary transaction? A simple utterance, "Good morning! I'm Dr. Jones." And with those words comes the unspoken but unqualified promise that the person has the knowledge, skills, and—most important—the commitment to use them ethically on the other's behalf.

But is it ethical to have appointments so short that you can't remove the shoes and socks of a diabetic patient? Is it ethical to have an elderly patient with poor vision on a dozen drugs when you have no access to a database of drug interactions? Is it ethical to have patients wandering in the doughnut hole of Medicare Part D and needing to decide whether to pay for food or a new prescription?

Clear Sailing

Such imbalances bring me to a metaphor from the world of sailing. There are three principal points of sail. When the wind is at your back, the boat is flat and progress is real but almost imperceptible. There's no tipping so there's no problem with balance. When there's a following sea, however, you can feel a little sick to your stomach.

When you're sailing on a reach, or perpendicular to the wind, the boat is still almost flat and your lunch can remain stable. The sandwiches won't slide, the wine won't slosh. Again, balance is no problem. But sailing across the wind will not get you to a challenging target. When you want to go exactly where the wind is coming from, you can't. You have to slant slightly off the direct course, which is called beating, or sailing to windward. Now the boat is heeling, and maintaining balance can be difficult.

But when things go exactly right—the sails are trimmed perfectly, the crew's weight is distributed correctly, and the sheets are as tight as possible—the thrill is incomparable and you can let out a scream. It's not truly human; it's not even primate. But it's close to a primal scream, and it signals that the boat is sailing as well as it can against the wind, and progress toward the goal is predictable.

I stated earlier that the worst imbalance in current medical education is the failure of our medical schools to trumpet the defects of the U.S. health care system and to commit to correcting them. Our health care system has terrible shortcomings. I believe we should enlist medical students as agents of change, committed to designing a

system of care that is equitable, cost-effective, prevention oriented, and universal—and thus moral. The students should have coursework, summer experiences, projects, an activist focus, and consistent mentoring on this subject. I envision a program similar to an MD/PhD or other joint-degree design. I picture a cadre of dedicated and innovative faculty who would bring to the program insight from diverse areas of medicine and from the social sciences. Following this rich activist experience should be additional medical training that prepares these students for leadership.

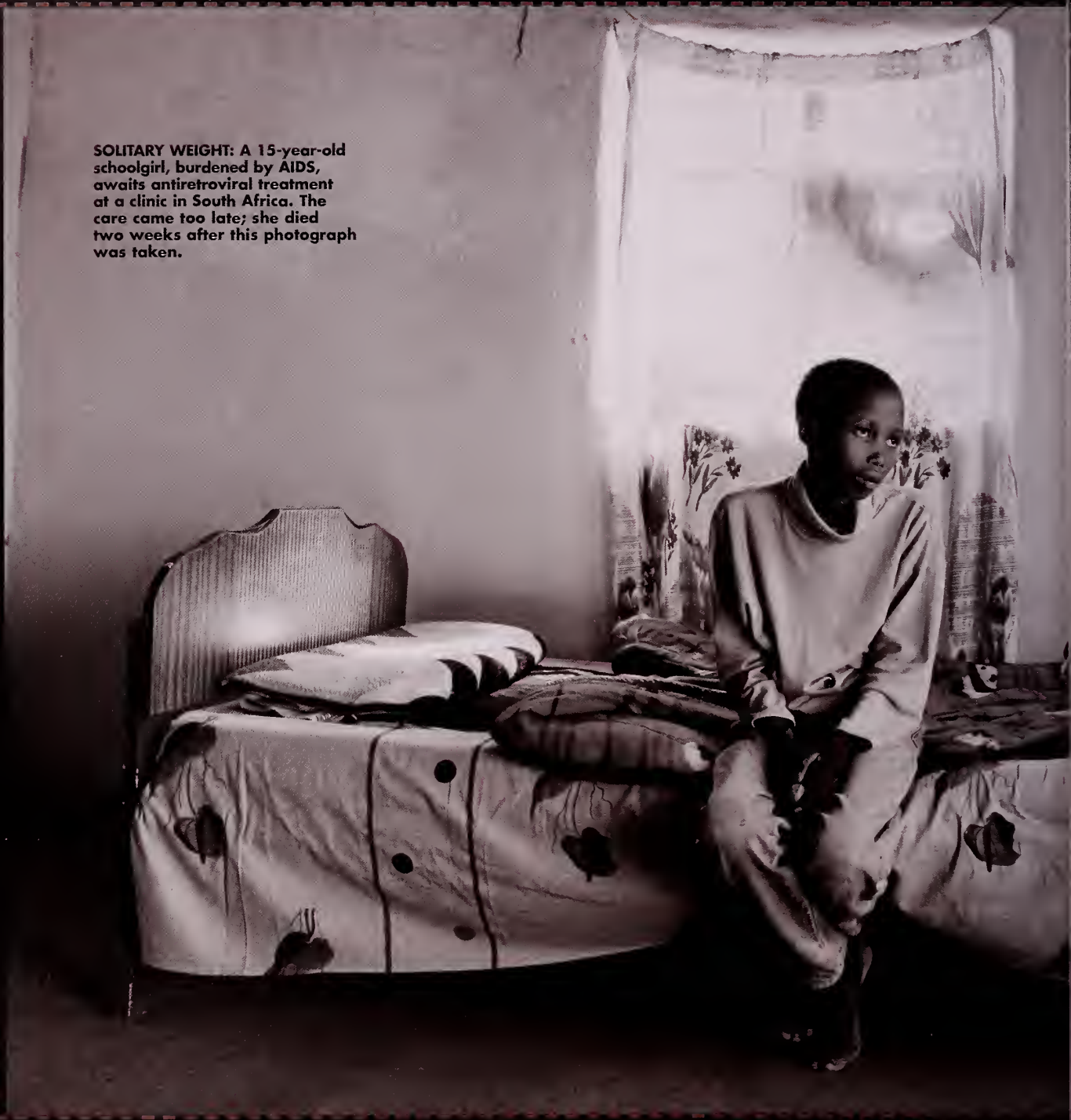
I don't know what the specific recommendations would be. (Peter Medawar, the British immunology Nobelist, said, "Never ask me about the future of research. If I knew what it was, I'd be doing it now.") But I'm not troubled that we'll be starting with amateurs. Noah's ark was built by amateurs; professionals built the *Titanic*. Similarly, I'm not concerned that we'll be starting with so few people arrayed against the titans of health care. As Margaret Mead said, "Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has."

If we can convince medical students and faculty to apply the standards of medical education to the problems of health care; if they search for solutions that are intellectually dazzling, emotionally gratifying, and morally transcendent; if they join with students and faculties from related disciplines in public health, social science, and economics; and if they recognize that a broad systems approach is needed, then we'll see roaring progress to windward.

There's a big wind out there opposing change. It is generated by a hugely successful commercial and for-profit world entrenched against the radical revision of health care that I believe we need. But when our new craft is sailing just right—when the helm, the sails, the sheets, the keel, and the crew are all in balance—and we start to make our ineluctable course to windward, through the noise we'll hear that deep, throaty, primal scream, and we'll know we're on the way to better health and health care for all Americans. ■

Daniel D. Federman '53, the Carl W. Walter Distinguished Professor of Medicine at Harvard Medical School, has served as a mentor to generations of HMS students. This article was adapted from a tribute Federman gave to Jordan Cohen '60, president emeritus of the Association of American Medical Colleges.

SOLITARY WEIGHT: A 15-year-old schoolgirl, burdened by AIDS, awaits antiretroviral treatment at a clinic in South Africa. The care came too late; she died two weeks after this photograph was taken.



THE OBSTACLE



The most critical roadblock to delivering care in the developing world is not **money**, but an implementation **bottleneck**.

by JIM YONG KIM

EACH YEAR AT LEAST TEN MILLION preventable deaths occur around the world. Most of these deaths take place in developing countries, usually among children, young mothers, and people with HIV. While more money is always needed, funding isn't the biggest challenge we face in preventing these tragedies. The biggest challenge is the delivery gap that prevents existing, often simple health interventions from reliably reaching those who need them.

The situation in Africa is especially dire. In southern Africa, millions have already died from AIDS. In South Africa, more than one-quarter of adults are infected with the virus. The HIV epidemic has also created a resurgence of tuberculosis, which kills more than a million people a year. Again, the toll

SOURCE

Despite the existence of proven treatments and much more money available now to pay for them, an implementation bottleneck prevents care from reaching patients.

is highest in Africa. A child dies of malaria every 30 seconds, and most of those deaths occur in Africa as well. Every year, we bear witness to millions of deaths, all from conditions that are routinely treated in the developed world.

Meanwhile, health spending in Africa—both public and private—though much improved over the past decade, falls far below levels found almost anywhere else. The number of physicians working in Africa is just as skewed. We often hear that more Malawian physicians live in Manchester, England, than in Malawi, and that more Ethiopian doctors can be found in Chicago than in Ethiopia.

What's especially tragic is that we know how to prevent or treat the most prevalent and deadly diseases. Take, for example, the risk of an HIV-positive mother transmitting the virus to her unborn child. Currently, the best way to prevent transmission is to provide the mother with prenatal services and, if appropriate, a combination of antiretroviral therapies to reduce viral load to undetectable levels. In an emergency, a single dose of nevirapine will also prevent transmission. Yet only an estimated 30 percent of pregnant women who need prevention-of-mother-to-child-transmission services actually receive them. And only half of pregnant women infected with HIV have access to nevirapine.

Statistics on the use of insecticide-treated bed nets to prevent malaria infection are just as troubling. These nets can reduce infant mortality from malaria by 20 to 30 percent. Every African child living in areas where disease-carrying mosquitoes are endemic should be sleeping under a bed net, but less than 10 percent do.

In neither of these cases is the problem the lack of a proven solution. The fundamental problem is one of consistently and effectively delivering interventions that are known to save lives.

Bridging the Gap

African nations and other resource-poor countries are not alone in this delivery gap, of course. The U.S. health care system has its own share of delivery problems. As of several years ago, we were still only 69 percent successful at meeting the standard for administering beta blockers within 24 hours to people

admitted to hospitals for chest pain. The United States spends up to 17 percent of its gross domestic product on health care, and yet our health outcomes aren't as good as those in countries that spend far less.

Admittedly, few African countries can rely solely on their own national budgets to fund the kind of health care systems they need. But the estimated cost of providing decent primary care—and even more complicated care—in developing countries is much lower than one might expect. A recent analysis of a project in Rwanda suggests that it is possible to build a system that—when linked to primary care services—can treat such diseases as AIDS, tuberculosis, and malaria for \$25 to \$50 per person each year. Compare that to the United States, where we spend about \$7,500 per person on health care annually.

As funding for health in developing countries grows, it is conceivable that there will soon be enough resources to build functioning health care systems in even the poorest settings. To achieve such a lofty aim, though, we will need to dramatically improve our capacity to deliver health care interventions, both simple and complex, in resource-poor settings. For, despite the existence of proven treatments and much more money available now to pay for them, an implementation bottleneck prevents care from reaching patients.

Meanwhile, the Bill & Melinda Gates Foundation and other funders are investing billions of dollars to develop new tools to treat the deadliest diseases. This investment is absolutely critical. Any physician who has confronted drug-resistant tuberculosis will tell you how desperate the need is for new treatments. But when these new tools hit the market, I fear the bottleneck will just become more clogged.

One key to clearing the bottleneck is, I believe, to work toward developing what might be called the science of health care delivery—to systematically capture global health successes and failures, study them, and then widely disseminate the lessons learned to practitioners and policy makers. Moreover, we must create robust programs that will train a new generation of implementers and link those implementers together in communities of practice to allow the process of generating—and spreading—new insights to continue.



FEVERED PURSUIT: This year-old boy waits with his aunt for malaria treatment at a hospital in Tanzania. Unless treated within 24 hours of developing symptoms of the disease, children under the age of five risk death.

The Discovery Channel

At the press conference to announce the eradication of smallpox in 1979, physician and epidemiologist D. A. Henderson was asked, “Now that you’ve eradicated smallpox, what’s the next major disease you want to take on?” His answer: “Bad management in public health.”

Indeed, if you asked anyone who was involved in smallpox eradication what it was like to be part of a vac-

ination campaign of that magnitude, they would tell you it wasn’t a vaccination campaign. It was an epidemiological and management campaign—and those strategies were the key to the campaign’s success. That kind of intense focus on management and implementation is lacking in today’s efforts to stamp out other diseases, which just might help explain why we’re falling short.

Health care delivery is complex, but it’s not a black box. We can and must develop better ways to capture

We've made huge contributions to clinical research and clinical science. But one piece is missing—the science of health care delivery.



HOME ALONE: Orphans hold candles of remembrance during a ceremony marking World AIDS Day in Johannesburg, South Africa. More than one-quarter of adults in South Africa are infected with HIV.

this complexity and then teach what we learn about effective care delivery to our students here and—most important—in the developing world. We can lay claim to being the best in the world at teaching basic science. We've made huge contributions to clinical research and clinical science. But one piece is missing—the science of health care delivery. To overcome the challenges we face today in global health, we need a new cadre of leaders—ones who are trained in the best and most effective ways to deliver interventions.

Of course we need to keep investing in health care systems in poor countries. We need better infrastructure; we need more money for medications, equipment, and supplies; we need new therapies. All of these things are critical, but this type of investment won't unstop the implementation bottleneck.

In fact, if we don't unclog the bottleneck, we run the risk that much of what we invest will be wasted. Today, we have literally billions of dollars in new spending—all of it sorely needed—to treat disease in the developing world. But we don't have support—or even a plan—for the creation of leaders who will ensure the money is well spent.

Stopping needless deaths in the developing world—from AIDS, from tuberculosis, from malaria—is within our reach. Let me tell you about a recent patient of ours in Rwanda. Jean presented at our clinic with both tuberculosis and HIV. He literally looked like a skeleton. Yet his CD4 count was over 500, so we didn't need to start him on antiretrovirals. With just food and medications for his tuberculosis, he began to recover. In a short time, he had his health back and, soon, had grown downright chubby.

This case illustrates what is possible, not just for Jean, but for millions of others. The challenge and the opportunity are before us—to significantly increase our understanding of effective care delivery, to teach what we learn to implementers worldwide, and to make good on the promise of dramatically improving the health of poor nations. ■

Jim Yong Kim '86 is chairman of Harvard Medical School's Department of Global Health and Social Medicine, director of the François-Xavier Bagnoud Center for Health and Human Rights at the Harvard School of Public Health, and chief of the Division of Global Health Equity at Brigham and Women's Hospital. This article was adapted from the HMS Alumni Day Symposium talk he gave in 2007.

PHOTO: KIM LUDBROOK/EPA/CORBIS

Change of Address

Harvard Medical School is playing a new role to help ensure the sustainability of international health projects.

Despite unprecedented new financial resources and medical advances, a significant global health delivery gap prevents care from consistently reaching the patients who need it most. To remedy the situation, Jim Yang Kim '86, chairman of Harvard Medical School's Department of Global Health and Social Medicine, teamed with Paul Farmer '90, a cofounder with Kim of Partners In Health, and Michael Porter, a Harvard Business School professor who leads in the field of strategy for complex organizations, to launch the Global Health Delivery Project (GHD). Their goal: to transform global health delivery from a series of small, well-intentioned but disconnected efforts to a worldwide movement based on twenty-first-century technology, standards, and efficiency.

Effective and consistent care delivery is, in many ways, a managerial challenge: In poor settings especially, its success depends on understanding the multiple factors that affect complex health systems, as well as the ability to carry out basic public health functions, accommodate multiple medical specialties, and mobilize staff, facilities, and information over sustained periods. Yet efforts to capture and learn from program experiences have been limited, leaving global health implementers isolated, with little opportunity to learn from colleagues' experiences or to share their own.

GHD aims to create such opportunities by—for the first time—systematically

evaluating the outcomes of care delivery projects worldwide and sharing them with other global health implementers. To jumpstart this initiative, GHD is developing a new generation of tools that not only use rigorous analysis, but also draw on numerous disciplines, web-based information-sharing communities, and partnerships with centers of excellence in health care delivery.

In doing so, GHD has taken a lesson from Harvard Business School by creating analytic frameworks, including in-depth field case studies that document the best and most challenging examples of health care implementation. Ten such case studies have been completed, with 25 more planned for the next two years.

The project's online presence, GHDonline, is just as critical. The website's virtual communities of practice connect health care implementers across borders. By joining the communities, implementers throughout the world can rapidly share their best practices and experiences, collaborate with peers both locally and internationally, and access an extensive library of practical information. And a targeted custom search engine allows members to quickly find relevant information without wading through standard search results. The first four GHDonline communities to become active now center on tuberculosis infection control, patient adherence and retention, drug-

resistant tuberculosis, and health information technology.

But current health care implementers aren't the only focus of GHD. A new academic field of global health delivery studies will teach tomorrow's global health leaders to become experts in health care implementation. A curriculum is being developed to reach a range of students—including undergraduates, graduate students, physicians, and mid-career global health implementers—in the United States and around the world. Using GHD's in-depth global health case studies, this new curriculum is being piloted at Harvard before being made widely available.

GHD plans to partner with a number of centers of excellence to create hubs for collaborations that link academic institutions, nongovernmental organizations, and public sector health care delivery organizations. Such partnerships will allow faculty to study care delivery at leading global health sites and to teach their findings to students. These training sites will also offer programming as diverse as field internships for graduate students, sessions for large groups of community health workers, and executive education leadership courses for mid-career professionals. GHD expects to establish three partnerships with centers of excellence during the next five years.

To learn more about the Global Health Delivery Project, visit www.globalhealthdelivery.org. ■

by JOHN W. GITTINGER, JR.



INSIDE

BONES BROUGHT THEM TOGETHER, the surgeon and the dentist-physician—bones and the nearly magical light that penetrated flesh to reveal them. That magic was the x-ray. During the latter half of the 1890s, both men would use this newfound light in ways that would prove pivotal to future generations.

The surgeon rode the wave of early enthusiasm for the technology to construct a Christmas card that boasted an x-ray of his professor's arm—and the Civil War bullet lodged in it for nearly three decades.

IMAGE: JIM WEHTJE/PHOTODISC/GETTY IMAGES






OUT

Early investigations of x-ray by two Harvard-educated physicians revealed the technology's benefits—and dangers.

He also used the technology to lay a foundation of anatomical knowledge that would forever inform his profession.

The dentist-physician, a man for whom research was a part of life, devoted decades to characterizing the new imaging tool and to tweaking its design to improve its performance. He also sought to make the technology safer: An x-ray-induced injury to his hand led to a lifelong effort to convince others to proceed with care.

We don't know if the two men ever met. They did, however, debate one another in the



ROLLINS

stated, “X-light kills.” He then presented evidence by detailing the fatal results that two-hour exposures on each of eleven days had produced on two robust male guinea pigs.

pages of the *Boston Medical and Surgical Journal*. The exchange between these two—Ernest Amory Codman, Class of 1895, and William Herbert Rollins, Class of 1879 (and Harvard School of Dental Medicine Class of 1873)—was brief but feisty. It occurred in 1901, less than five years after a holiday card and an injury had affected each man’s life.

Take a Letter

It was in the winter of that year when letters exchanged between Rollins and Codman appeared in the weekly predecessor to the *New England Journal of Medicine*. The correspondence began with a note from Rollins, published on February 14, a day usually reserved for hearts and flowers. For Rollins, however, it was a day for directness and urgency: “X-light kills,” he began.

Rollins then presented evidence of the dangers of x-light—a term he persisted in using when describing the x-ray—by detailing the fatal results that two-hour exposures on each of eleven days had produced on two robust male guinea pigs. Rollins was convinced his experimental design showed x-rays were the deadly force. The experiment was hardly

Rollins’s first or last with these energetic waves. It would become one of nearly

180 investigations, observations, and comments he united in his book

Notes on X-Light, published in 1904 by The University Press in Cambridge,

Massachusetts. The findings he was reporting to readers of this medical journal had been introduced three years earlier in an engineering journal. Rollins elected to restate them for physicians; without proper precautions, he worried, x-rays posed significant dangers to both patients and doctors.

At least one reader took an interest in Rollins’s letter. With a rapidity not found in printed journals today, the February 21 issue of the journal carried a response from Codman. In “No Practical Danger from the X-Ray,” Codman stated, with the occasional added emphasis, “*practically*, in careful hands, there is no danger from the use of the x-ray to the patient and very little to the operator.” He went on to describe thousands of exposures he had made of patients at Massachusetts General Hospital, Children’s Hospital, and in his private practice, “without a single case of dermatitis,” an outcome that stepped carefully around Rollins’s worry that cumulative and unprotected use caused death, albeit death to a laboratory animal. To ensure Rollins understood the breadth of his experience in the field, Codman signed himself, “Surgeon to Out Patients, Massachusetts General Hospital; Skiagrapher [an early term for radiologist] to the Children’s Hospital.”

The journal’s next issue contained Rollins’s response. In it he provided a second example, this time involving a pregnant guinea pig. The fetal guinea pig had died, a lesson Rollins extrapolated to humans, cautioning that he was aware of one instance where the use of x-rays had caused a woman to abort. Empirical to his core, Rollins then gently upbraided his critic. With new agents, he said, it was important to determine their power so as to know how they could be controlled. “Nothing is gained by criticizing such experiments,” Rollins wrote, “for criticism is sterile, while

CODMAN wrote in “No Practical Danger from the X-Ray” that, “*practically, in careful hands, there is no danger from the use of the x-ray to the patient and very little to the operator.*”

experiment is fertile. An experiment can only be discredited by another experiment.”

Catch Some Rays

So who were these correspondents, and what was their interest in this new tool that could see to the bone? Rollins, age 48 at the time, is considered the Father of Health Physics. He was also the first to describe radiation-induced cataract. Codman, who had just turned 31, is celebrated as both the Father of Shoulder Surgery and as the founder of the End Result System, the outcomes movement that gave birth to today’s Joint Commission on Accreditation of Healthcare Organizations.

Like many physicians in the late 1800s, Rollins and Codman were drawn by the promise and mystery of the wondrous light that had been introduced to the world by a quiet German physics professor. In November 1895, Wilhelm Röntgen had been experimenting with cathode ray tubes when he made one of those experimental mistakes that history christens serendipitous. During a test, Röntgen placed a cardboard screen that had been treated with a fluorescent substance, barium platinocyanide, in front of an electrified vacuum tube known as a Hittorf–Crookes tube.

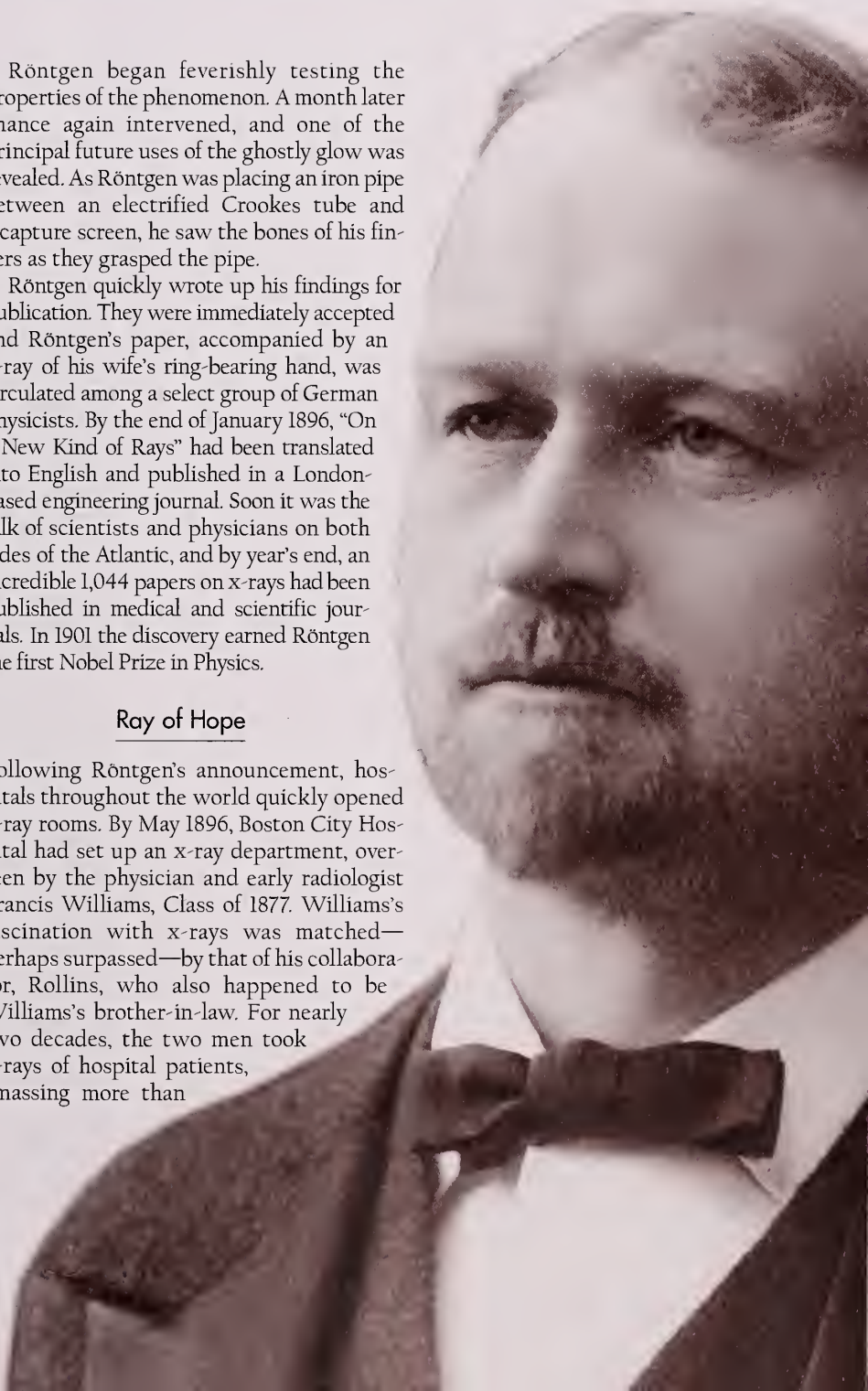
In the darkened laboratory, the tube produced fluorescence on the cardboard screen. Satisfied with the test, Röntgen was about to turn off the tube when he glimpsed a light several feet from where he was working. To see what it was, he struck a match. Its glow fell upon a forgotten screen that had been coated with a fluorescing solution and left to rest on his workbench. His surprise turned to amazement when he realized the screen was being illuminated by a faint cloud of flickering light waves that moved in unison with the electrical discharges of the tube’s inner coil.

Röntgen began feverishly testing the properties of the phenomenon. A month later chance again intervened, and one of the principal future uses of the ghostly glow was revealed. As Röntgen was placing an iron pipe between an electrified Crookes tube and a capture screen, he saw the bones of his fingers as they grasped the pipe.

Röntgen quickly wrote up his findings for publication. They were immediately accepted and Röntgen’s paper, accompanied by an x-ray of his wife’s ring-bearing hand, was circulated among a select group of German physicists. By the end of January 1896, “On a New Kind of Rays” had been translated into English and published in a London-based engineering journal. Soon it was the talk of scientists and physicians on both sides of the Atlantic, and by year’s end, an incredible 1,044 papers on x-rays had been published in medical and scientific journals. In 1901 the discovery earned Röntgen the first Nobel Prize in Physics.

Ray of Hope

Following Röntgen’s announcement, hospitals throughout the world quickly opened x-ray rooms. By May 1896, Boston City Hospital had set up an x-ray department, overseen by the physician and early radiologist Francis Williams, Class of 1877. Williams’s fascination with x-rays was matched—perhaps surpassed—by that of his collaborator, Rollins, who also happened to be Williams’s brother-in-law. For nearly two decades, the two men took x-rays of hospital patients, amassing more than





BOWDITCH, unaware of a bullet lodged near his elbow since his military service, was delighted when an x-ray revealed the Civil War relic.

150,000 images as well as an understanding of the technology that Rollins would use in his efforts to refine it.

In his writings, Williams credits his brother-in-law with being one of the first to recognize the treatment potential the technology offered medicine. But perhaps each inspired the other. In the preface to his *Notes on X-Light*, Rollins attributes his dedication to the field to Williams: "In these notes are recorded some impressions derived from experiments made after the day's work, as a recreation, yet with the hope of learning to design and construct apparatus for my friend, Dr. F. H. Williams, who has done most to show the importance of X-Lights in medical diagnosis." This "recreation" was both kind and costly. Although Rollins had a thriving dental practice in Boston, his passion for research and invention continually challenged the household income. In the last volume of his personal journal, Rollins credits the mindfulness and thrift of his wife, Miriam, with the fact that his research, which may have cost upwards of \$30,000 over the years, strained, but never broke, the Rollins's bank.

Rollins continually chronicled his observations and experiments in his *Notes*. By early 1898, he had begun jotting down reports of what would become just one of the dangers of the technology: skin burns, a problem he had learned of on the job. In January of that year, Rollins suffered a severe burn on one of his hands after it was exposed to an activated vacuum tube.

For the next six years, Rollins devoted himself to determining the dangers of x-rays, devising precautions to protect against those dangers, and redesigning the vacuum tubes and apparatuses associated with the technology to improve the efficiency of the tubes and the resolution of the radiographic images. Some of his inventions—the Rollins box, a shielded housing that permitted rays to escape only through a single opening; the use of collimating diaphragms to narrow the beam; and the development of high-voltage tubes—ultimately served to limit the exposure of patients, physicians, and other workers who operated or produced x-ray equipment. In addition to hardware improvement, Rollins dispensed cautionary advice to those who applied the technology to medical purposes: wear radio-opaque glasses; enclose the tube in a leaded housing; and limit irradiation of patients to only those areas of interest, covering adjacent areas with radio-opaque material.

Unfortunately, Rollins's cautions were ignored, perhaps because of the blind enthusiasm of those working with the new technology. Or perhaps the neglect occurred because Rollins toiled alone in his home laboratory, published his findings quietly and in somewhat obscure engineering journals, and rarely ventured to professional meetings. His reluctance to participate in such meetings was so great that he had to be persuaded to attend an American Roentgen Ray Society gathering at which he was awarded an honorary membership. The citation he received may have only added to Rollins's frustration; it did not mention his x-ray safety work.

Brought to Light

As with Williams and Rollins, Codman was mesmerized by the x-ray and its ghostly images. In 1895 Codman had just begun his surgical practice and his position as an assistant in anatomy at Harvard Medical School when he began exploring Röntgen's rays. Like many who were probing the new technology, Codman sought out the needed equipment. The proper ingredients were found right in the laboratory of his mentor, Henry Pickering Bowditch, Class of 1868.

Codman's excitement is palpable in his writings of this period. In the autobiographical preface to *The Shoulder*, a landmark treatise published in 1934, Codman wrote: "It would be impossible to give the reader an idea of the thrill experienced by those of us who did the early X-ray work. I remember that an early contribution of mine in the *Boston Medical and Surgical Journal* was to show that the X-ray was likely to help us in studying the epiphyseal lines! . . . We almost forgot that it was all because Röntgen had noticed something that many others might have observed."

For two of his years in Bowditch's laboratory, Codman concentrated on taking images of the entire human skeleton, a body of work he gathered into a single bound edition that he donated in 1898 to the Rare Books Room at the School's Francis A. Countway Library of Medicine, where it still resides.

Codman also may have indirectly used the x-ray as a courtship tool. In his first year of work with Bowditch, Codman took an x-ray of the professor's right arm. The image delighted Bowditch, for it clearly showed a rifle bullet lodged near his elbow, a relic he had been unaware of for 30 years but had likely acquired during his service

in the Civil War. Codman, too, was pleased by the image, so much so that he turned it into a Christmas card for the professor. The careful surgeon and researcher made a mistake on the card, however. "Merry Christmas" became "Marry Christmas," perhaps an inadvertent slip revealing Codman's affections for the professor's niece, Katherine Putnam Bowditch. The two were married in 1899.

Codman continued to research the applications of x-ray for several more years, giving special attention to its uses in the practice of surgery. Before long, though, the pull of surgery won Codman over and he set aside x-ray work. As his autobiographical preface shows, his return to surgery may also have allowed him to express his change of heart about the dangers of x-ray exposure: "for we all had burns and some of us gave them. Many of my old friends are dead from x-ray cancer. It was fortunate for me that my interest in surgery was greater than in Röntgen's discovery."

Indeed, evidence of the dangers of unprotected exposure to x-rays was mounting. Radiologists offered the best—or worst—proof. Their ranks were being thinned by early deaths. And those who lived had the evidence written in their hands: scarred, distorted, and often lacking digits. Such disfigurement was so preva-

lent that banquet planners for radiology meetings in the 1920s avoided serving roast beef; the gloves most radiologists wore to hide their hands made cutting such food difficult.

Service for Two

Before he died of metastatic cutaneous melanoma in 1940, Codman had built a considerable legacy. His "End Result Idea" or "End Result System of Hospital Organization" would lead to the establishment of standards for the measurement of the outcomes of medical care. And in addition to his contributions to the field of surgery, Codman had developed the Registry of Bone Sarcomas. Spurred by the development of a bone tumor in "one of my best patients," Codman had contacted physicians throughout Massachusetts, polled them on their bone sarcoma cases, and compiled the treatments and outcomes they had achieved. After a book on bone sarcoma and five years of work—done without compensation—Codman's data engendered the first cancer registry in the United States.

Rollins, too, left a legacy, one that mandated discovery in generations to follow. In addition to his research and inventions in radiology—as well as in dentistry, photography, radio, and mechanical pianos and organs—Rollins sought to ensure there would always be an opportunity to tinker and dream. In his will, he bequeathed \$58,000 to the Smithsonian Institution for the establishment of a fund "for exploration beyond the boundaries of knowledge." The fund was formalized in 1935, six years after his death.

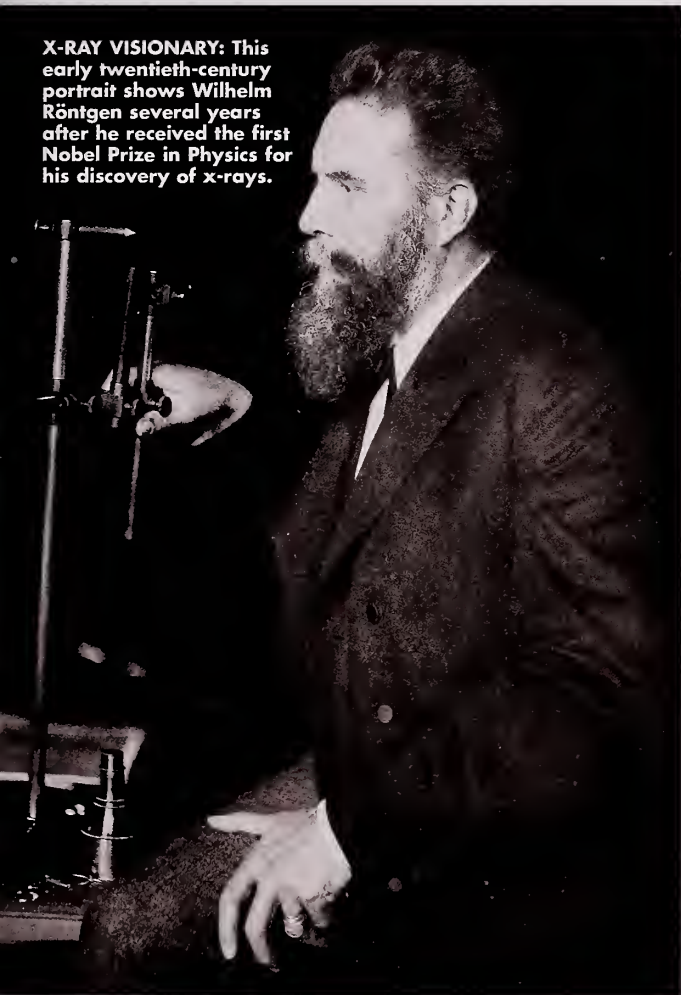
Rollins's warnings of the dangers of x-rays lay quietly through decades that brought war and mass destruction until those of a new age, the atomic era, rediscovered—and began to heed—them.

Absent a record of a meeting or even of other letters personally exchanged between these physician-researchers, it is impossible to know if they ever had the chance to discuss face-to-face the difference of opinion they had inked for public airing. It is tempting, however, to think they did. After all, both were members of Boston's professional class and had affiliations, either direct or indirect, with Boston's social register. Both were avid outdoorsmen, each arranging their professional schedules to include blocks of days out of the city on hunting and hiking getaways. And both enjoyed walking along the streets of the city's Back Bay neighborhood, where they lived just a few blocks apart.

Had they talked, they likely would have discovered that aside from this single professional dust-up, they approached life with much the same vision. They would have found that each held as a core value the importance of a life devoted to humanity. ■

John W. Gittinger, Jr. '71 is a professor of ophthalmology and neurology at Boston University School of Medicine.

X-RAY VISIONARY: This early twentieth-century portrait shows Wilhelm Röntgen several years after he received the first Nobel Prize in Physics for his discovery of x-rays.



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